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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

HISTORICAL ANALYSIS OF THE BATTLE OF LITTLE BIGHORN UTILIZING THE JOINT CONFLICT AND TACTICAL SIMULATION (JCATS)

by

Michael A. Charlebois
and
Keith E. Pecha

June 2004

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** June 2004	**3. REPORT TYPE AND DATES COVERED** Master's Thesis	
4. TITLE AND SUBTITLE: Historical Analysis of the Battle of Little Bighorn Utilizing the Joint Conflict and Tactical Simulation (JCATS)			**5. FUNDING NUMBERS**
6. AUTHOR(S) Michael A. Charlebois and Keith E. Pecha			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)			**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			**12b. DISTRIBUTION CODE**

13. ABSTRACT (maximum 200 words)

The purpose of this thesis is to determine which of three competing theories of outcomes for the Battle of Little Bighorn is most the plausible utilizing the Joint Conflict and Tactical Simulation (JCATS) program developed by Lawrence Livermore National Laboratory. There are many practical benefits that JCATS can provide today's military with regard to training and educating soldiers for future conflicts. JCATS can be used to train soldiers in planning and executing missions in ways not feasible during conventional field training exercises utilizing live bodies and real vehicles. It is also being increasingly used for actual mission planning. However, very little has been done using JCATS to war-game past operations.

There are two points to be gained by using JCATS to model a historical battle such as the Battle of Little Bighorn. First, it validates the ability of JCATS to accurately model actual historical scenarios while identifying many of the specific limitations of the program. If the military is going to use computer simulations such as JCATS in lieu of field training exercises to train soldiers, it must first be determined if the program produces realistic results. Modeling an actual battle and comparing the results of the program with what actually occurred is one means of doing so. Second, modeling historical battles, particularly defeats, may assist in discovering lessons learned. In a field training exercise, a defeated force can be brought back to life and given another opportunity to apply the lessons learned from its previous defeat. Real battles afford no such opportunity. Computer modeling of past battles would allow military planners to isolate individual events and decisions and study their impact on the outcome.

14. SUBJECT TERMS High Resolution Modeling, After Action Review (AAR) with High Resolution Combat Modeling, Simulation, Modeling.			**15. NUMBER OF PAGES** 137
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UL

NSN 7540-01-280-5500 Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

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HISTORICAL ANALYSIS OF THE BATTLE OF LITTLE BIGHORN UTILIZING THE JOINT CONFLICT AND TACTICAL SIMULATION (JCATS)

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Submitted in partial fulfillment of the
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MASTER OF ARTS IN DEFENSE ANALYSIS
SPECIAL OPERATIONS/LOW INTENSITY CONFLICT

from the

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ABSTRACT

The purpose of this thesis is to determine which of three competing theories of what occurred at the Battle of Little Bighorn is the most plausible by utilizing the Joint Conflict and Tactical Simulation (JCATS) program developed by Lawrence Livermore National Laboratory. There are many practical gains that JCATS can provide today's military with regard to training and educating soldiers for future conflicts. JCATS can be used to train soldiers in planning and executing missions in ways not feasible with conventional field training exercises utilizing live bodies and real vehicles. It is also increasingly being used for actual mission planning. However, very little has been done using JCATS to war-game past operations.

There are two points to be gained by using JCATS to model a historical battle such as the Battle of Little Bighorn. First, it validates the ability of JCATS to accurately model actual historical scenarios while identifying many of the specific limitations of the program. If the military is going to use computer simulations such as JCATS in lieu of field training exercises to train soldiers, it must first be determined if the program produces realistic results. Modeling an actual battle and comparing the results of the program with what actually occurred is one means of doing so. Second, modeling historical battles, particularly defeats, may assist in discovering lessons learned. In a field training exercise, a defeated force can be brought back to life and given another opportunity to apply the lessons learned from its previous defeat. Real battles afford no such opportunity. Computer modeling of past battles would allow military planners to isolate individual events and decisions and study their impact on the outcome.

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ACKNOWLEDGMENTS

This work was not produced solely by the efforts of the two authors. It is, rather, a culmination of the generosity and expertise of numerous others. First, there is Dr. Maurie Wier and Dr. Frank Giordano, whose enlightening instruction and contagious enthusiasm in mathematical modeling provided us with the tools and concepts needed to tackle this project. Thanks to Gordon McCormick, father of the SOLIC program, who provided us with his vision and insight with regards to this thesis, as well as the ability to "distill complex problems to their essence, which is not a non-trivial task". Thanks to Jennifer Duncan for keeping everything running smoothly behind the scenes and assisting with the travel needed to conduct research. To Bard Mansager, Combat Modeling Genius and Climber Extraordinaire, thanks for keeping us on the right path without losing his sanity while dealing with two of us. On the topic of sanity, we must also thank Jim Barnett, Mike Uzelac, Thad Peck and the rest of the Lawrence Livermore National Laboratory staff for helping us keep our sanity while working out countless unique requirements for which JCATS was never designed. Thanks to Dr. Paul West of the United States Military Academy at West Point for sharing his work and that of his students in the realm of combat modeling. A very special thanks is also due to both Mr. Alan C. Aimone, Senior Special Collections Librarian of the West Point Library's Special Collections and Archives Division and Les Jensen, Curator of Arms at the West Point Museum for their very special historical knowledge and access to incredibly unique information. For all of our mapping needs of the actual battlefield, we would like to thank Mr. Ed Nath, who obtained the terrain database from the National Imagery and Mapping Agency, now known as the National Geospatial-Intelligence Agency. A special thanks is also due to Monica Wlaznak, for her computer graphics wizardry that produced the painstakingly detailed battlefield maps. Finally, we want to thank the command, the professors, and all of the supporting members at the Naval Postgraduate School for providing an educational experience unparalleled anywhere else in the world. Our debt

for having had the opportunity to learn in such an enriching environment can never be repaid, but we will strive everyday to live up to the standards of excellence taught there as disciples of the school and the Defense Analysis program.

I. INTRODUCTION

> Know the enemy and know yourself; in a hundred battles you will never be in peril. When you are ignorant of the enemy but know yourself, your chances of winning or losing are equal. If ignorant both of your enemy and of yourself, you are certain in every battle to be in peril.
>
> Sun Tzu in "The Art of War," 500 B.C.

A. PURPOSE

Much has been written about the Battle of Little Bighorn, quite possibly more than any other battle in history. However, because there were no survivors from Custer's five companies, any detailed account depicting actions of the battle relies heavily upon speculation. This lack of facts provided room for numerous theories and much debate.

In August 1983, a grassfire burned much of the vegetation covering the Little Bighorn battlefield exposing many previously undiscovered artifacts. The following year, archaeologist Richard A. Fox Jr. set out to examine the battlefield in an archaeological fashion. Using modern forensic investigative techniques to examine the artifacts discovered, he was able to piece together a detailed theory of his own about the progression of the battle as it occurred on that fateful day of June 25, 1876. In 2000, Navy Lieutenant Matthew Burns tested Fox's theory against the two carefully researched and documented theories of authors Steven Ambrose and John S. Gray as the subject of his thesis. He chose to compare the three competing theories of how the battle occurred utilizing the techniques provided in the U. S. Army's FM 101-5. His intent was to discover which of the three theories was most plausible. He found Fox's theory as the most likely, followed by Gray's, with Ambrose's being the least probable of the three.

It is the intent of this thesis to take that work a step further with the use of modern computer modeling techniques. We propose to answer the same question, "Which is the most probable account of how the battle of Little Bighorn occurred?" We attempt to model as accurately as possible the five companies from Custer's 7th Calvary and the

Indian forces that fought on that day. It is our expectation that running multiple iterations of the three competing theories will further illuminate which of the three theories is most plausible.

Our decision to model the battle of Little Bighorn is two-fold. First, we must admit that we share the same simple curiosity and fascination with the battle that has captured the imagination of generations. However secondly, we feel that there are practical gains that computer conflict simulations can provide today's military with regard to training and educating soldiers for future conflicts. A variety of computer conflict simulation models are currently being used to train soldiers in planning and executing missions in ways not feasible with conventional field training exercises utilizing live bodies and real vehicles. They are also being increasingly used for actual mission planning. However, very little has been done a using computer simulation to war-game past operations.

We think that there are two points to be gained. First, it would validate the program being used. If the military is going to use computer simulations in lieu of field training exercises to train soldiers, it would be helpful to know if the program produces realistic results. What better way to do this than to model an actual battle and see if the results match what actually occurred? Second, modeling historical battles, particularly defeats, may lead to discovering more detailed lessons learned. In training, a defeated force can be brought back to life and given another opportunity to apply the lessons learned from its previous defeat. Real battles afford no such opportunity. Computer modeling of past battles would allow military planners to isolate individual events and decisions and study their impact on the outcome.

B. BACKGROUND

The battle of Little Bighorn was only one of fifteen battles that took place during the Great Sioux War; which occurred between March of 1876 and May of 1877 throughout the Northern Plains of America. A violation of the Fort Laramie Treaty of 1868 by the white settlers sparked the Indian unrest that led to the war. The discovery of precious resources, especially gold, prompted the desire to reclaim the land that had been given to the Indians in a treaty. The United States government tried without success to

find a legal reason to take back the land as thousands of whites flooded the Black Hills in search of gold. Finally, in an act of frustration, President Ulysses S. Grant ordered all Indians off their hunting grounds and back onto their reservations with the threat of force. Eventually, war was declared on the Sioux Indians under the pretext that the United States needed to protect the Crow Indians from Sioux Indian raiding parties.

The War Department tasked Brigadier General Alfred H. Terry to locate and return all Sioux and Northern Cheyenne Indians to their reservations. Brigadier General George Armstrong Custer commanded the 7th U.S. Cavalry Regiment, an element of Terry's larger force. When one of Custer's officers, Major Marcus Reno, discovered a large Indian trail leading west toward the Bighorn Country, Custer's battalion was detached from Terry's force to follow it. It was at this moment in time that Custer made what is argued by some to be the first of his mistakes. Custer decided to leave behind his Gatling gun platoon because he thought them too cumbersome to move at the speed he wished to travel. He also declined to take four additional companies offered to him from the 2nd Cavalry Regiment. Many speculate that this latter decision was due to Custer's reluctance to have his 7th Cavalry Regiment share the glory of the upcoming battle with any other unit. It was Custer's intent to trap the Indians between his force and the main element led by Brigadier General Terry, which included an Infantry Regiment and a Cavalry Regiment, as both men led their units into position. Their march began on May 17, 1876 and continued until June 24th when Custer's regiment discovered a large Indian trail described as "more than a mile wide" (Connell, 1984, p. 267). An excerpt from LT Burns' thesis describes the events as follows:

> Eager to engage the enemy, Custer broke camp around 11 P.M. and led his regiment on a night march towards the Little Big Horn. It is important to note that the regiment had traveled some eighty miles in the last three days, on a limited amount of rest. Four hours later, at approximately 3 A.M., Custer ordered an extended break for the regiment. At this time, he received a report from Lt. Varnum confirming the existence of the suspected Indian camp.
>
> The regiment was mobilized at approximately 8 A.M. on the 25th to begin making their way toward the river. Custer rode ahead to see firsthand the signs of the Indian encampment. Unfortunately, when he arrived at the

> Crow's Nest, an ancient vantage point about fifteen miles east of the Little Big Horn, "…a haze had settled over the Little Big Horn and he could see nothing". (Ambrose, 1975, p. 431) Custer then returned to the regiment, which was halted at the divide between the Rosebud and the Little Big Horn, and received reports of possible sightings of Sioux scouts. At this point, he made the decision to attack immediately. His primary concern, it is clear, was that his approaching force had been spotted. Custer believed this would result in a dispersal of the Indian camp if he did not engage them as soon as possible. It was this belief that drove Custer toward the Indians, without considering the possibility of defeat.
>
> In perhaps a manner that could have foreshadowed the confusion to come, Custer issued ad hoc orders to his company commanders (Graham, 1995, pp. 135, 157, 211). Captain Frederick Benteen and Companies D, H, and K were ordered to the south, presumably to cut off any escape routes in that direction. A pack train of supplies and ammunition was guarded by Captain Thomas McDougall's Company B, as well as small contingents from each of the other companies, and lagged behind the advancing columns. The rest of Custer's regiment continued towards the river, traveling along what is now known as Reno Creek. Another possible sighting of Sioux scouts compelled Custer to further split his forces, as he ordered Major Reno and Companies A, G, and M to cross the river and attack the Indian camp from the south. Meanwhile, Custer would move north along the river and, as he vaguely reassured Reno, support his attack.

Custer only retained five of the twelve companies under his command. This totaled 210 men out of the original 600. Although it is not certain that Custer ever observed first hand the size of the Indian force, he did send a message to Captain McDougall ordering the placement of the pack trains and another to Lieutenant Colonel Benteen ordering him to come quickly and bring the packs. This would seem to indicate that he realized he was about to engage a significant force. However, while moving to Custer's location, Benteen came across Major Reno's retreat in progress and decided that Reno's situation was more pressing than that of Custer's and decided to stay and assist Reno. Benteen even sent another messenger to the pack trains ordering that the movement of ammunition packs to Reno's position be quickened.

Custer's element was decimated at what is now referred to as "Last Stand Hill." There were no survivors from Custer's five companies and no one was able to observe the actions that took place during the fateful battle. Although we know in great detail the events that led up to the battle and the resting place of the dead; we do not know for certain the events that took place in between during this historic battle.

C. METHODOLOGY

Our first step in building a model to test each of the three theories is to identify which of the conflict simulation programs available would provide the greatest level of detail and flexibility without jeopardizing reliability. We decided to utilize the Joint Conflict and Tactical Simulation (JCATS) program developed by Lawrence Livermore National Laboratory. We used version 4.1.0, the newest version available at the time of our thesis. The JCATS software allows for a greater level of detail, resolution, and integration of relational databases than any other conflict simulation software available. It is for this reason that it is the preferred computer based conflict simulation software for the Department of Defense in the Special Operations environment. After deciding upon JCATS, our next step is to learn the intricacies of the program and identify the information requirements. We studied the program manuals and received training from the JCATS developers at the Lawrence Livermore National Laboratory and Professor Paul West, an experienced JCATS modeler who currently heads the Department of Systems Engineering Simulations Center at the United States Military Academy at West Point.

Utilizing the forensic study of the battlefield provided by Fox, we were able to identify which weapons and munitions data was required to build our database for the JCATS program. We were fortunate in discovering official Ordnance Records published in 1879 that compared the accuracy of captured Indian rifles to the accuracy of the Springfield 1873 carbine with which Custer's battalion was equipped. The ballistics data included the mean horizontal and vertical deviation at various ranges, which we then used to calculate the Probability of Hit (PH) for each weapon, as taught by Brigadier General (Retired) Frank Giordano and Dr. Maurice Weir, authors of *Mathematical Modeling* and professors at the Naval Postgraduate School.

Our next task is to build each of the munitions, weapons, and individual combatants in the JCATS databases to exact detail. First, weapons characteristics such as the number of rounds each weapon can fire before reloading and the effective ranges of their respective munitions were researched and programmed. Next, we created each entity as either a cavalry soldier or Indian and assigned each entity with a weapon and munitions type. The individual entities were then grouped together in formations called aggregates. The aggregates were then positioned on a terrain database developed by the National Imagery and Mapping Agency (NIMA). This helps ensure the accuracy of the line of sight required for target acquisition and weapons effects as well as the ability of each entity to traverse the terrain. Our final step was to assign movement orders to the entities according to each author's theory and the work of Lieutenant Burns. We will run each theory ten times and analyze the output files produced by JCATS to determine how close the results of each simulation were to the known outcome of the actual Battle of Little Bighorn.

D. LIMITATIONS

While there are many things that can be accomplished by using a computer simulation that could not otherwise be easily replicated in the real world, it is important to understand the limitations of computer conflict simulation as well. This is particularly true when trying to replicate historical scenarios as opposed to capturing a trend. As Mr. Paul West from the System's Engineering Department at West Point told us, "When dealing with computer simulations, you have to remember that reality might be an outlier." In other words, the actual outcome of a particular battle may well have been one of those one in a million long shots that one could never expect to happen again in a thousand repeated simulations, let alone ten. There are numerous rogue events that could occur in reality changing the course of a battle to an outcome that could never be realistically simulated nor expected to occur again. For instance, there is currently no way to simulate the charismatic leadership that some individuals innately possess or the effects that may occur if those officers are killed early in battle rather than later. The example Professor West used to illustrate this point was the decisive influence exhibited by Chamberlain during the Battle of Little Roundtop at Gettysburg. Chamberlain's unit

was responsible for holding key terrain on the Union flank. Low on ammunition after repelling numerous assaults and in danger of being overrun, Chamberlain ordered an audacious bayonet charge that broke the Confederate attack and was able to continue defending his position until he could be reinforced. After the battle, one Confederate soldier recalled having Chamberlain dead in his sights, but something he couldn't quite describe prevented him from pulling the trigger.

Both Chamberlain's heroic leadership and the Confederate private's decision not to shoot had a significant impact on the outcome of the battle, but both would be difficult to represent with any degree of accuracy in a computer simulation. Battle involves flexible and decisive action from leaders. In a computer simulation, the entities can simulate neither human personalities nor situational awareness beyond their programmed field of view, range of engagement, and dictated movement orders. However, we find the inability to factor these characteristics into a computer model completely acceptable since a counter argument can be made that military planners do not take these factors into account when developing military plans for future operations, as specific units or commanders are often not identified at the time of a plan's conception. Instead, we are looking for trends over multiple simulations of the same events to provide data worthy of predicting a likely outcome.

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II. JCATS AND DATA INPUT CHOICES

Our evaluation of Burns' thesis and initial literature review led us to identify two important requirements for the foundation of our simulation. First, we had to clearly identify the differences between the three competing theories and determine how to replicate them within the JCATS program. Second, and more important to the foundation, was replicating the weapons used on the battlefield in order for the simulation to be as accurate as possible.

A. TERRAIN AND ENTITY CREATION

The first requirement was relatively straight forward with regard to research and data collection. It simply required us to read Burns' thesis and each of the authors' books to understand their competing theories. Programming each of the three theories into the simulation software using a terrain model of the battlefield provided by the National Imagery and Mapping Agency was more difficult. This was accomplished by creating each entity, whether it was an Indian or cavalry soldier, with the appropriate weapons and giving it a movement order consistent with each theory's logic. The difficultly with this portion of the preparation was mainly due to the finicky nature of JCATS. It is not a user friendly program and setting the system up often requires even the most experienced user to reload the program several times in order to get everything right, let alone a user with absolutely no experience with the system whatsoever. Fortunately, the analysts at Lawrence Livermore National Laboratory (LLNL) never failed to go out of their way to provide timely support for the numerous difficulties encountered while setting up the program. The second requirement, however, replicating the weapons used at the Battle of Little Bighorn, posed several unique challenges that could not be readily answered by technical support.

B. WEAPONS TYPES AND NUMBERS

JCATS, as developed by Lawrence Livermore, was designed to simulate modern battles with a database comprised of current weapons, sensors, and platforms. Although it allows the user an extraordinary degree of flexibility in tweaking the capabilities and

ballistics characteristics of numerous weapons systems, it was not designed to replicate actual modern battles, much less a historical battle between mounted horse cavalry and plains Indians. For that reason, much attention is devoted to explaining our methodology for overcoming these unique problems.

First, several sources were consulted to identify the various weapons used on the battlefield. Determining the weapons used by the soldiers of the 7th Cavalry was relatively easy. Even though the soldiers of the 7th Cavalry were allowed the option of purchasing their own firearms, the overwhelming majority of them were armed with the standard issue Springfield Model 1873 carbine and the Colt Model 1873 Single Action Army revolver. Although there were a few notable exceptions, such as the "Remington .50-caliber sporting rifle with octagonal barrel and two revolvers that were not standard issue—possibly Webley British Bulldog, double-action, white-handled revolvers" (Shulman, 1998) that Custer is thought to have carried, these were not deemed to have affected the outcome in any significant way and were therefore not included in our study. Sabers were left behind for this campaign in order to eliminate the rattling noise they made while riding and were likewise not included in the study. The only weapons modeled for the cavalry were the Springfield Model 1873 carbine and the Colt Model 1873 Single Action Army revolver.

Modeling the weapons for the Indians proved to be a much more painstaking task due to the wide variety of weapons they used. The main resource consulted for determining this information was *Archaeological Insights into the Custer Battle*, a book by Douglas D. Scott and Richard A. Fox, Jr. detailing the finding of the archaeological study conducted in 1984. Using metal detectors to locate artifacts from the battle, Scott and Fox went on to examined each bullet and shell casing found in an attempt to determine not only the various types of weapons used, but also the number of each. An effort was also made to try to track the movement of individual weapons across the battlefield by examining the firing pin and extractor markings on each shell casing the same way police do today when investigating crimes. Many other sources were also consulted in an attempt to obtain detailed weapons data, but Scott and Fox's was the most beneficial in attempting to determine how many weapons of each type were present at the

battle. The details of our methodology are outlined in Appendix A, but our final decision was to use the estimate given by Scott in a separate article he authored with Melissa A. Connor titled "Post-mortem at the Little Bighorn." In it they estimate

> …that if 1,500 Indian warriors took part in the battle…, then about 375 would have been armed with muzzle-loaders and single-shot rifles such as Sharps and Ballards, and about 192 would have been armed with repeating weapons. The rest may have used bows and arrows and a few old pistols and revolvers.

Using this as a starting point, we then further subdivided the two categories of firearms, repeaters and single-shots, using the same method of extrapolation that Scott and Fox used to obtain their estimate of 192 repeaters. This methodology is explained in Appendix A, but the results are as follows:

Repeating Rifles	
Model 1860 Henry	85
Model 1866 Winchester	85
Model 1873 Winchester	22
Total	192

Single-shot Rifles & Muzzle-loaders	
Sharps .50	78
Springfield .50	16
Muzzle-loader (Rifled)	140
Muzzle-loader (Smoothbore)	141
Total	375

The first adjustments made to these numbers was a bit of rounding up in order to account for the fact that several of the positions that the Indians are known to have fired from were outside the area examined by Scott and Fox. For the repeaters, both the Model 1860 Henry and the Model 1866 Winchester were rounded up from 85 to 100. The Model 1873 Winchester was rounded up from 22 to 25. This gives the Indians a total of 225 repeating rifles. This is still 150 less repeaters than the 375 one would arrive at if one used the 25 percent estimate given by Charles Windolph of Company H (Scott and Fox, 1987). We chose to start out on the lower end of the spectrum in order to use the conditions most favorable to Custer as a starting point for each of the three scenarios. For the single-shot and muzzle-loaded rifles, the Sharps .50 was rounded up from 78 to

80, the Springfield .50 down from 16 to 15, and the muzzled-loaders were set at 140 each for both the rifled and the smoothbore. This put the total of this group of weapons at exactly 375. Out of 1,500 Indians, this would leave the remaining 900 armed with bow and arrows. We opted to arm 50 of these 900 with the Army's Model 1873 Springfield carbine to represent weapons that were captured during the course of this battle and from the Battle of Rosebud that had occurred eight days earlier. Although the three different theories use different estimates for the number of Indians involved, we opted to keep the number at the generally accepted minimum of 1500 for each of the three scenarios for control purposes. As stated earlier, we wanted to begin each of the three scenarios under the most favorable of conditions for Custer's forces.

C. BALLISTICS

Once the number of each type of weapon was determined, the next step was to obtain detailed ballistics information about the various weapons. JCATS requires the user to input specifics such as range, muzzle velocity, magazine capacity, reload time, and the probability of achieving a hit at various ranges. The most important, and most difficult to calculate, were the PH/PK (probability of a hit/probability of a kill) curves. Below is an example of a default PH table taken from JCATS to better explain how JCATS uses this data during a simulation.

Range(m)	SSDF	SSEF	SMDF	SMEF	MSDF	MSEF	MMDF	MMEF
0	45	90	0	95	59	70	0	29
200	40	80	0	85	29	40	0	14
400	29	59	0	65	10	20	0	1
800	20	40	0	45	1	10	0	0
1500	10	20	0	25	0	1	0	0

Table 1. Default PH data from JCATS

In the left column is the range in meters for the data provided for each four letter code in the other columns. The four letters represent each of the possible combinations of an engagement between any two entities. The first letter signifies the status of the shooter. The letter "S" indicates the shooter is stationary while an "M" indicates the shooter is moving. The next letter represents the status of the target. Again, an "S" means the target is stationary while an "M" denotes that the target is moving. The third letter signifies the posture of the target, an "E" for exposed or a "D" for defilade. The fourth letter represents the type of shot. The choices are "F" for a flank shot or "H" for a head shot. However, in JCATS, all shots against troops are considered "F" flank shots (LLNL, p. 7-12). The head shots only pertain to target groups such as armored vehicles and were not used in our scenario. The numbers under each four letter heading represent the probability of achieving a hit at that particular range. When graphed, this provides a probability curve. For example, in the chart shown above, there is a 65% probability of a stationary shooter hitting a moving target at a range of 400 meters. During the simulation, when an entity fires at a target, the computer goes to the appropriate PH chart for the weapons system used and extracts the data necessary for that particular engagement. Next, the simulation generates a random number to determine a hit or miss based upon the table's percentage. If it is not hit, the simulation continues with no degradation to the target. If the target was hit, then the computer will go to a similar table to determine whether the target is killed.

Our first step was to establish a baseline capability of each weapon. Not all of this data was readily available and our methodology in choosing each of these variables is outlined in Appendix A. The data for the Army's Model 1873 Springfield carbine and the Indian's Model 1866 Winchester were available from comparison tests conducted in 1879 and documented in *Ordnance Notes No. 115*. Data for the Springfield and Sharp's rifles were also included, although they were of a different caliber than of those documented by Scott and Fox to have been used in the battle. Utilizing the data found in *Ordnance Notes No. 115,* we converted the standard deviations to probable errors in vertical and horizontal deflection. The method of calculation used is documented in Appendix A.

We initially intended to compensate for the human factor by examining the PH tables for the weapons systems already included in JCATS. We figured that even though the technical data for the weapons we were modeling would be different, the variations in PH ratios when calculating the odds of hitting a moving verses a stationary target should be about the same. However, after examining the PH/PK values in JCATS, many inconsistencies in the PHs were discovered. Further investigation revealed that JCATS includes a disclaimer in their documentation that stating "sample PhPk files are unclassified and are not guaranteed by the CSL or LLNL". Simply translated, this means that someone using JCATS should not trust the default settings to accurately represent the characteristics and capabilities of the weapons systems included with the program. The results produced by JCATS will only be as good as the initial input data that is fed into it, or, in the lingo of computer programmers, garbage in results in garbage out. Ultimately we were forced to rely not only upon our own research, but also our experience as soldiers and marksmen to estimate the effect that shooting at a moving target, both while moving and stationary, would have on the PHs.

We soon discovered that there is a dearth of information on the degradation in the probability of hitting a target once the target, the shooter, or both start moving. Phone calls to the Army Marksmanship Unit, Army Research Institute, Battle Lab, and the Malone Moving Target Range complex all failed to yield any credible statistics that one could use to calculate the probability of hitting a moving versus a stationary target. One article was finally discovered in the July-August 1987 edition of *Infantry* magazine. In it, an article titled "Marksmanship Training" by Joel D. Schendel cites the finding in an experiment where basic trainees were tested on a target range after receiving instruction designed to improve their performance. The range included both moving and stationary targets.

> The stationary targets appeared at ranges between 25 and 300 meters, the moving targets at ranges between 15 and 185 meters. All of the moving targets moved at 45 degrees relative to the firer at four (185 meters only) or eight meters per second. Overall, these soldiers averaged 27 percent hits against moving targets and 37 percent hits against stationary targets. Hits against moving targets equaled 28 percent at 75 meters, 23 percent at 125 meters and 15 percent at 185 meters.

> Even when seven shooters from the Running Target Branch, U.S. Army Marksmanship Unit (AMU), fired this scenario twice (the first time for practice), the number of hits against moving targets fell off rapidly at ranges beyond 35 meters. Only half the moving targets presented at 75 meters were hit and this number decreased to 39 percent at 125 meters and 32 percent at 185 meters.

The degradation statistics given for seven shooters from the Army Marksmanship Unit were used as a baseline for the SMEF (Stationary shooter, moving target) column of the PH tables. These numbers were chosen because we wanted the PH tables to represent the capabilities of only the weapon itself, not those of the shooter. JCATS has a separate area to define the capabilities of the soldiers and we wanted to keep the two variables separate as much as possible. Although this is impossible to do with regards to engaging moving targets, we reasoned that soldiers from the Running Target Branch of the U.S. Army Marksmanship Unit should have performed as close to perfection as possible. Therefore the numbers cited in the *Infantry* magazine article should represent a near perfectly trained marksman shooting a perfectly maintained weapon.

Our next step was to determine if the percentages entered into our new PH table reflected a realistic level of accuracy for each weapon. Graphs using Microsoft's Excel spreadsheet software were created to see a graphical representation of each weapon system's probability of a hit over distance (see figure below). Although we were not fortunate enough to have detailed ballistics data for each weapon, graphing the PH data in this manner at least allowed us to view each weapon's accuracy at various ranges with respect to each other. We wanted to ensure that we had not entered in data that did not pass the common sense test such as smoothbore muzzleloaders outperforming rifled carbines and repeaters.

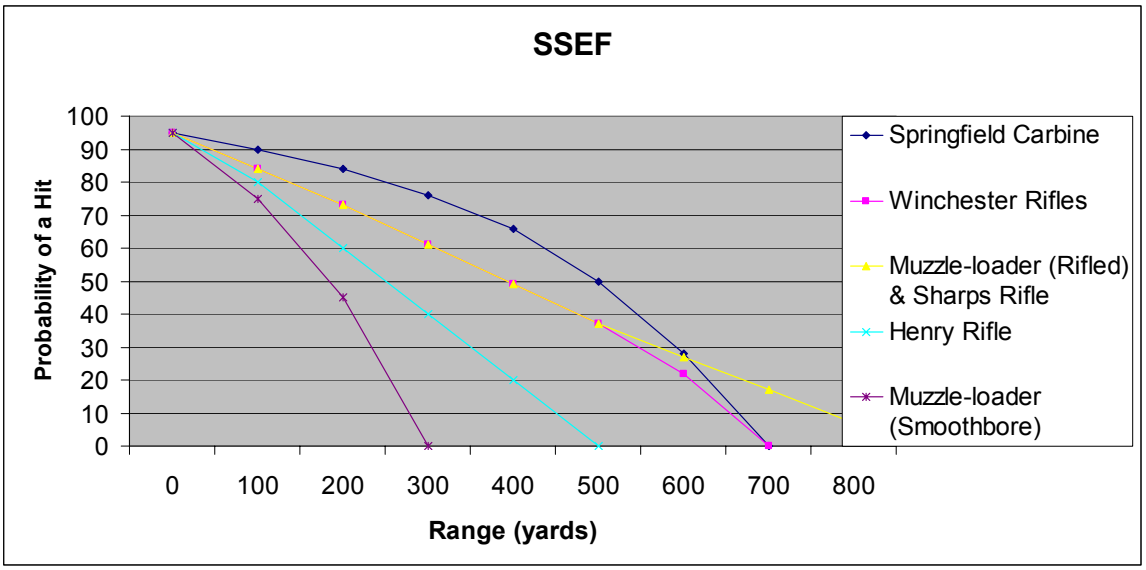


Figure 1. PH Comparison Graph.

Although the chart shows the weapons systems ranging out to over 800 yards, the Indians would not likely engage a target unless at fairly close range. Therefore, we needed to limit the engagement range during the simulation. We found that the JCATS simulation would allow an entity to engage a target as long as it was within the line of sight of the shooter and within the range of the weapon system. We controlled the engagement ranges of the simulation by changing the maximum range of the weapons to a lower value than the weapon itself could fire. This made the longer ranges of the PH tables irrelevant and kept the entities from engaging each other at unrealistic ranges. We then tested this approach by taking a reduced ratio of Indians to cavalry and placed them on the terrain at Little Bighorn outside of the maximum engagement range of the farthest shooting weapon. Next, we had both sides move towards each other and watched to see at what ranges the entities engaged each other. The data for each round fired is stored to a data file for detailed study. This method allowed us to simulate the realistic ranges for weapons engagements that were reported to have occurred on the battlefield.

This covers the initial settings most relevant to the outcome of our simulation. A detailed enumeration of our initial parameters for each theory is outlined in Appendix B. The two sides were now formed and armed. The next step was to place the combatants on the terrain model and give them movement orders consistent with each of the three authors' respective theories.

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III. THE THREE THEORIES

A. THEORY SELECTION

As stated earlier, this thesis is a continuation of the work started by Matthew Burns. His choice to compare the theories contained in the works of the three authors selected was not random. He felt that certain criteria needed to be met in order for a hypothesis to be worthy of consideration. He felt that a theory should do "more than state the obvious facts and offer a vague summary of what might have happened during the disputed stages of the battle" (Burns, p. 16). His thesis

> … established three key criteria for the selection of theories for modeling. First, the theory must have a sufficient level of detail. In order to construct the model consistent to the source theory, the theorist must have offered details concerning the movement/location of Custer's force prior to the battle, the size of the Indian force, the location where the actual fighting started, and the movement of both sides during the battle. Any theory without these variables would rely too much on independent extrapolation or assumptions of the modeler. Second, the theory must be an academic effort, with either science or primary and secondary sources as its foundation. Given the extensive collection of Little Big Horn literature, many theories are pure conjecture and selection from among those would be arbitrary at best. Last, the theories selected must be dissimilar enough to present an interesting cross section of informed analysis on the subject.

B. JOHN S. GRAY

First, it is important to note that although we have chosen to use the term theory to describe each author's approach, Gray himself is reluctant to do so and would prefer to use a more vague or ambiguous term. In his book titled *Custer's Last Campaign: Mitch Boyer and the Little Big Horn Reconstructed,* John S. Gray writes that his, "counterclockwise hypothesis, cannot qualify as a theory, for it is only a trial hypothesis, to be checked against further evidence" (p. 395). Gray's theory goes into great detail in describing the events leading up to "The Final Minutes," as Chapter 25 of his book is named. He even goes so far as to not only extrapolate the speed at which whole units traveled, but also specific individuals such as couriers as well. He accomplished this by analyzing in detail numerous first hand accounts of the battle. He then compared the

testimony given by various individuals of what they saw from various vantage points at specific times and correlated the information to develop a very precise timeline. Gray then measured the distance between sightings to determine the rate of movement for the various units and individuals. As far as the final minutes are concerned, Gray concedes that any explanation offered would be merely speculative. He does feel, however, that "a search for evidence that imposes constraints may at least reduce the possibilities to a finite number" (1991, p. 384). He further states that, "[s]ince there is more evidence on where the killing action occurred than on any other aspect, [he is] prompted to focus on this dimension and see what may be inferred from it." (1991, p. 384).

At the end of Chapter 23, which describes the final moments leading up to the end of Custer's fight, Gray describes Custer's five companies as being reunited on the reservation at 4:46 pm and states that they will all be dead in 39 minutes. This provides us with his interpretation of the length of the final battle. It is interesting to note that although Gray makes several references to the archeological work conducted by Fox; he never mentions Fox by name. Gray notes that the study was not published at the time of his writing and that he would therefore not comment on the artifacts found. Although he laments the fact that the archeological map developed from the position of the artifacts and burial markers "shows no geographical features, nor a single coordinate line; only metric numerals are printed on the margins with no mark to place the coordinate lines" (Gray, 1991. p. 386), he nevertheless uses Scott and Fox's map as an aide to developing his theory. Gray conducted some rather creative mathematics in applying the findings to an actual map and estimates that his results should not be off any more than 15 meters. This allowed Gray to observe how the markers are spread throughout the battlefield with relation to each other.

Gray's final minutes began with Custer's five companies entering the reservation from the south, very close to Calhoun Ridge. He deployed a squad to the west end of Calhoun Ridge to defend against approaching Indians while the rest of the regiment moved to the high ground on top of Calhoun Ridge. Gray interprets the layout of the markers as seeming to indicate that some of the heaviest of the fighting occurred where the squad was deployed. Gray feels that Custer's forces traveled in a counterclockwise

direction from Calhoun Ridge to Custer Ridge, then Custer Hill followed by the South Skirmish Line and finally the west perimeter. He then calculates the rate of movement to be about 6 miles per hour. This allows for 17 ½ minutes of halts for fighting and 17 ½ minutes of movement to complete the 1 ¾ mile perimeter. This accounts for a total fighting time of 35 minutes once Custer's forces reached Calhoun Ridge and started their movement around the perimeter.

Gray also suggests the possibility that there were two final stands that may have occurred simultaneously, one being the famous Custer's last stand at Custer Hill, and another involving 14 fleeing soldiers from the South Skirmish Line that die along the west perimeter. He describes Custer Hill as most likely only being large enough to support two companies and speculates that Custer sent a defensive force towards what is now known as the South Skirmish Line because Indians may have been spotted coming from the northwest first. Later, after observing Indians attacking Custer Hill from the northeast in what has come to be known as the Last Stand, these final 14 soldiers attempt to flee away from Custer Hill towards the west perimeter. The soldiers represented by the 14 markers on the west perimeter would have been making their last stand at about the same time the forces still on Custer Hill were making theirs. The map below depicting the battle according to Gray is taken from Burns' thesis.

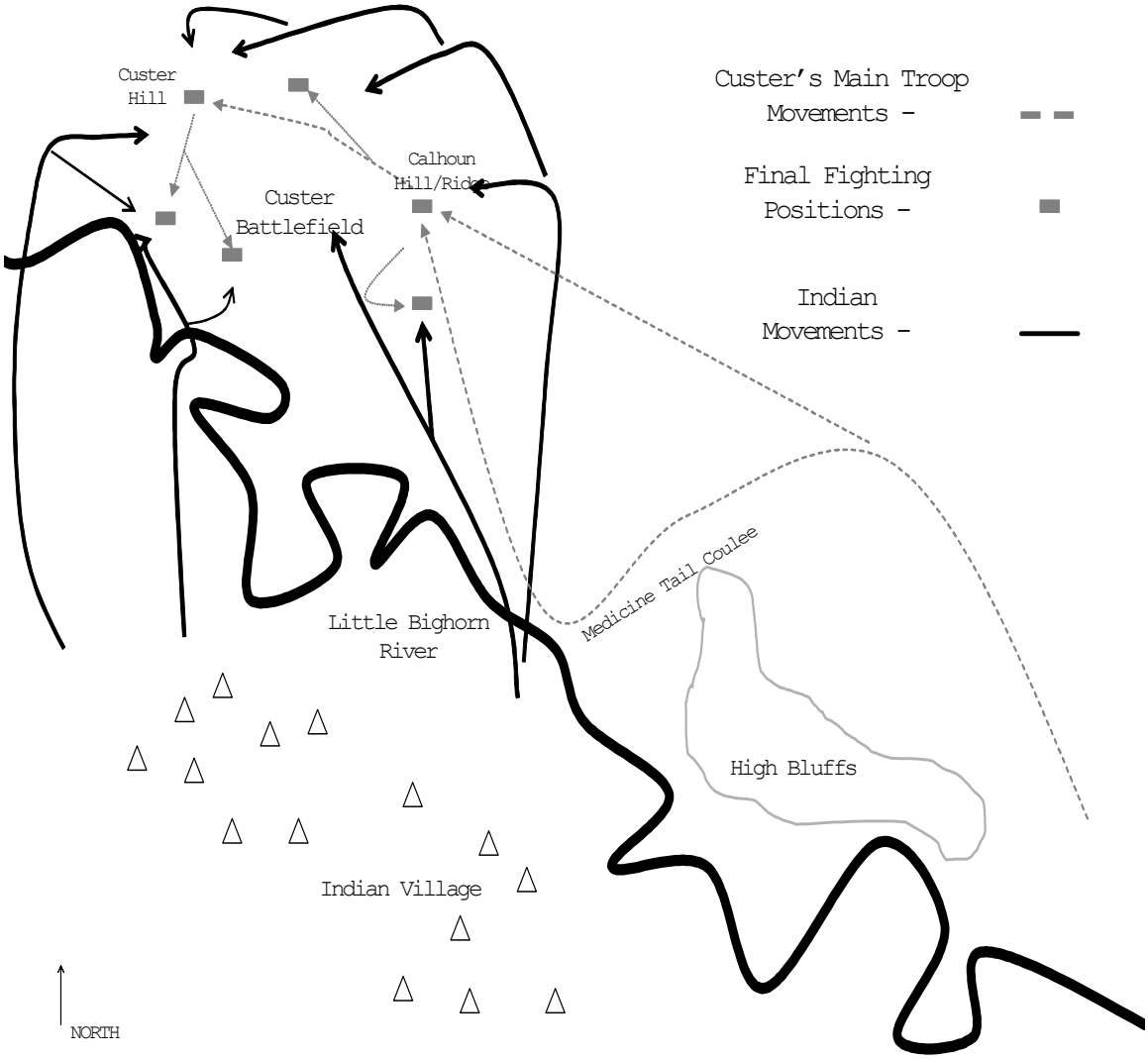


Figure 2. Actions at Little Bighorn According to Gray

C. STEPHEN E. AMBROSE

Stephen Ambrose's theory was included by Burns due to its historical relevance. It was written more than a quarter of a century ago and does not benefit from the archeological discoveries that Fox's or Gray's theories do. It is, however, as Burns puts it, "representative of the traditional view" (Burns, p. 23). Ambrose's book, *Crazy Horse and Custer*, is a parallel biography that follows the lives and development of both warriors that culminates with the Battle of Little Bighorn and their actions as leaders on the battlefield there. He attributes a great deal of the credit for Custer's defeat to Crazy Horse.

Ambrose's assessment of the battle estimates the number of Indians to be close to 3,000 warriors in all, separated into two engagements. The first engagement is against Reno's forces to the south as he attacked the Indian village in an attempt to force the Indians to flee to the north where Custer would be waiting. Ambrose believes that Crazy Horse had learned how the white man fought and anticipated Custer's flanking move. He theorizes that Crazy Horse withheld his warriors from the first fight with Reno in expectation of Custer's main attack. According to Ambrose, Custer traveled down Medicine Tail Coulee towards the river when he was met by a blocking force of 1,500 Hunkpapas warriors which forced him to turn to the right and head for the high ground. Ambrose states that "[a]t this point Custer realized, probably, that he was no longer on the offensive. Suddenly he was in a fight for survival" (Ambrose, 1975. p. 440). He believes that Custer led his forces directly to what is now known as Custer Hill in hope of setting up a defensive perimeter where he could hold out until reinforcements arrived. His forces were stretched out while being chased under fire by Gall's 1,000 Indians. Meanwhile, according to Ambrose, Crazy Horse led another 1,000 Indians around the backside of Custer Hill beating Custer to the top. Ambrose states that "[w]hat Crazy Horse saw before him was a long slope with a few more than 200 soldiers on it. With their backs to the top of the hill, they were fighting for their lives, most of them horseless by now, many wounded, hard pressed by Gall's force" (p. 442) According to Ambrose, Custer and his forces never reached the top of the hill. This theory deviates from normal Indian tactics in two major ways; a point that is acknowledged by Ambrose. First, "Crazy Horse was getting the warriors to ride away from the scene of action, something no one had ever been able to get them to do before" (Ambrose, 1975. p. 440). This is a reference to the engagement with Reno's forces to the south where the Indians were having great success. Second, "[i]n an Indian-versus-Indian battle, flanking was not necessary, in fact, it did not fit into the scheme of things, as the object in an Indian fight was to win honors, not kill enemies" (Ambrose, 1975, p. 445). In fact, Ambrose goes on to observe that "[i]n military affairs it is exceedingly difficult to outflank a flanking force, but when it is achieved it is usually spectacularly successful" (Ambrose, 1975, p. 445). Although it would have been highly unusual for the Indians to organize and fight in this

manner, this does not automatically discredit his theory, as there have been many examples of leaps in military tactics throughout history. Captain Horatio Viscount Nelson's divide and conquer technique used at the Battle of Trafalgar and the unconventional approach of T.E. Lawrence, better known as Lawrence of Arabia, are two examples that immediately come to mind. The map on the next page depicting the battle according to Ambrose is taken from Burns' thesis.

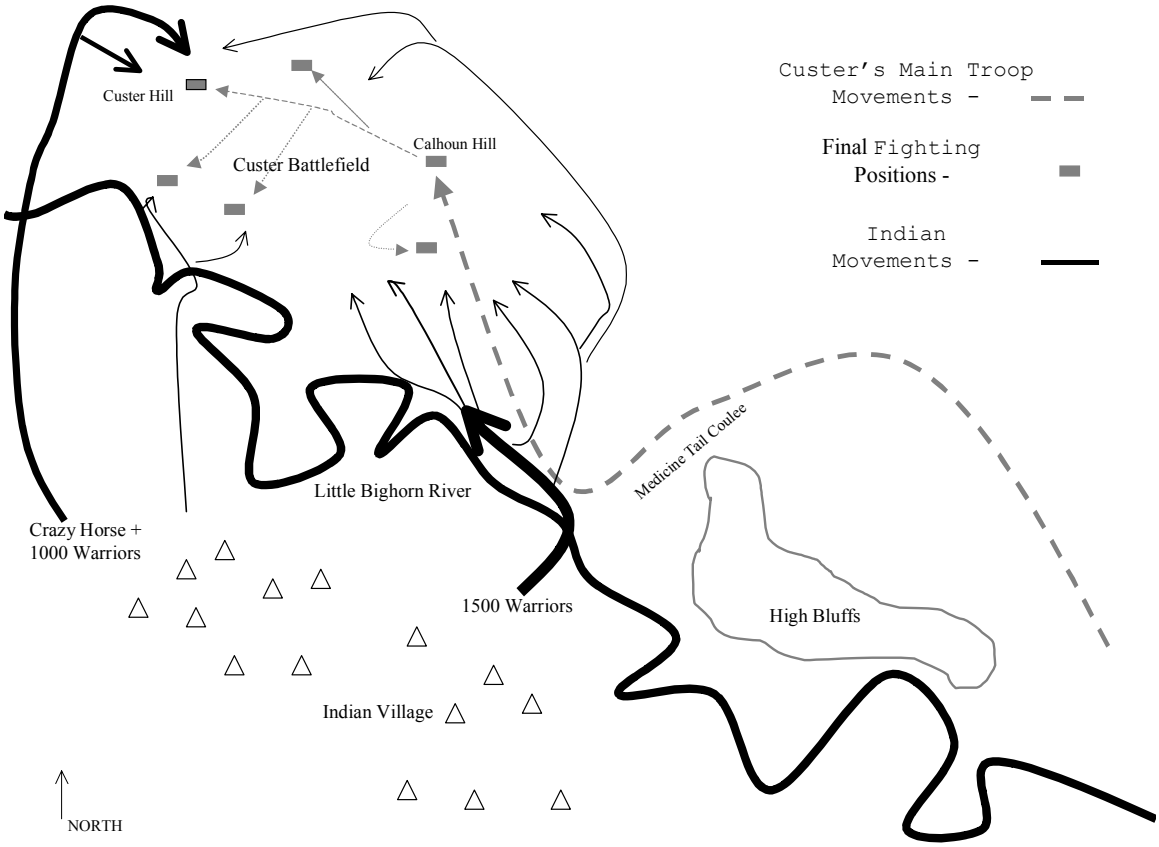


Figure 3. Actions at Little Bighorn According to Ambrose

D. RICHARD A. FOX, JR.

The third theory is provided by Richard Allan Fox, Jr. Fox's two-year archeological survey of the battlefield is a revolutionary approach to studying historical battles. As noted earlier, John Gray stated that Fox's report lacked detailed grid locations rendering the findings difficult to study and that this was probably due to pressure from outside sources that wanted to avoid publicizing precise locations that could possibly lead

to vandalism and destruction of the site. This would appear to be true since Fox's team used electronic surveillance equipment that automatically recorded an items description, depth it was found at, grid coordinates, orientation of the object, and then assigned it a catalog number. This way a detailed survey map was created as items were found rather than after the fact. Each item was placed in a presorted catalog numbered bag that corresponded to the computer assigned catalog number. Based on these findings, Fox created a model that he calls Tactical Stability.

Fox's Tactical Stability model is based on the standard cavalry tactics of the time where soldiers would fight with a standard 5 yard separation between individuals and a 15 yard separation between each four man squad. This tactic was used to provide an effective means of control during combat. He sought to discover whether or not tactical stability existed by studying the ejected shell casings. He hypothesized that if a group of shell casings were found with approximately 5 yard separation between weapons, then evidence of tactical stability existed. Fox then attempted to track the movement of individual weapons by analyzing the unique firing pin markings on each shell casing. Whenever he found groups of shell casings from different weapons that were closer together and but fewer in number, he interpreted this as a sign of disintegration of Tactical Stability. According to Fox, this occurs when men begin to bunch in together under stressful situations from enemy fire. This unintentional action is the result of losing their tactical discipline and wanting to feel safer by getting closer to each other. This can result in eventually fleeing under fire and in some cases, even throwing one's weapon to the ground while running away. Fox analyzed the pattern of the shell casing against his tactical disintegration model to create his theory of the events at little Bighorn.

According to Fox, Custer separated his forces into two wings. The right wing commanded by Captain Keogh consisted of companies C, I, and L. The left wing was commanded by Captain Yates and included companies E and F. Custer and his headquarters element went with the left wing. Fox agrees with the other three theories in their assessment that Reno's force was sent to attack from the south and failed to make an aggressive or convincing attack. Meanwhile, Custer intended to move to the north in an attempt to flank the left side of the Indian village. However, Fox believes that his intent

was to take the women and children hostage in order to force the braves to return to their village, not to act as a blocking force for Indians fleeing from Reno's attack. Fox acknowledges Custer's force reaching the Ford B site at the river and says that they did not cross. From there, Fox has Custer's left wing moving further north than anyone has ever placed him to a second crossing point at Ford D. There, they met with heavy resistance and moved towards the high ground eventually making their way to Custer Hill. Meanwhile, the right wing had moved to Calhoun Hill where it too was met with heavy Indian resistance from the south and west. According to Fox, the shell casings show that tactical stability was lost and men started fleeing across Custer Ridge towards Custer Hill as more Indians began to attack from the east, south and west. Finally, when Custer Hill is attacked from all direction, the remaining survivors flee down deep ravine. Fox discounts that there was ever a South Skirmish Line in any sense of a planned tactical formation. He believes that those who died along what is commonly called the South Skirmish Line did so while fleeing. He bases his opinion on the lack of a significant number of shell casings found along the way. The map on the next page depicting the battle according to Fox is taken from Burns' thesis.

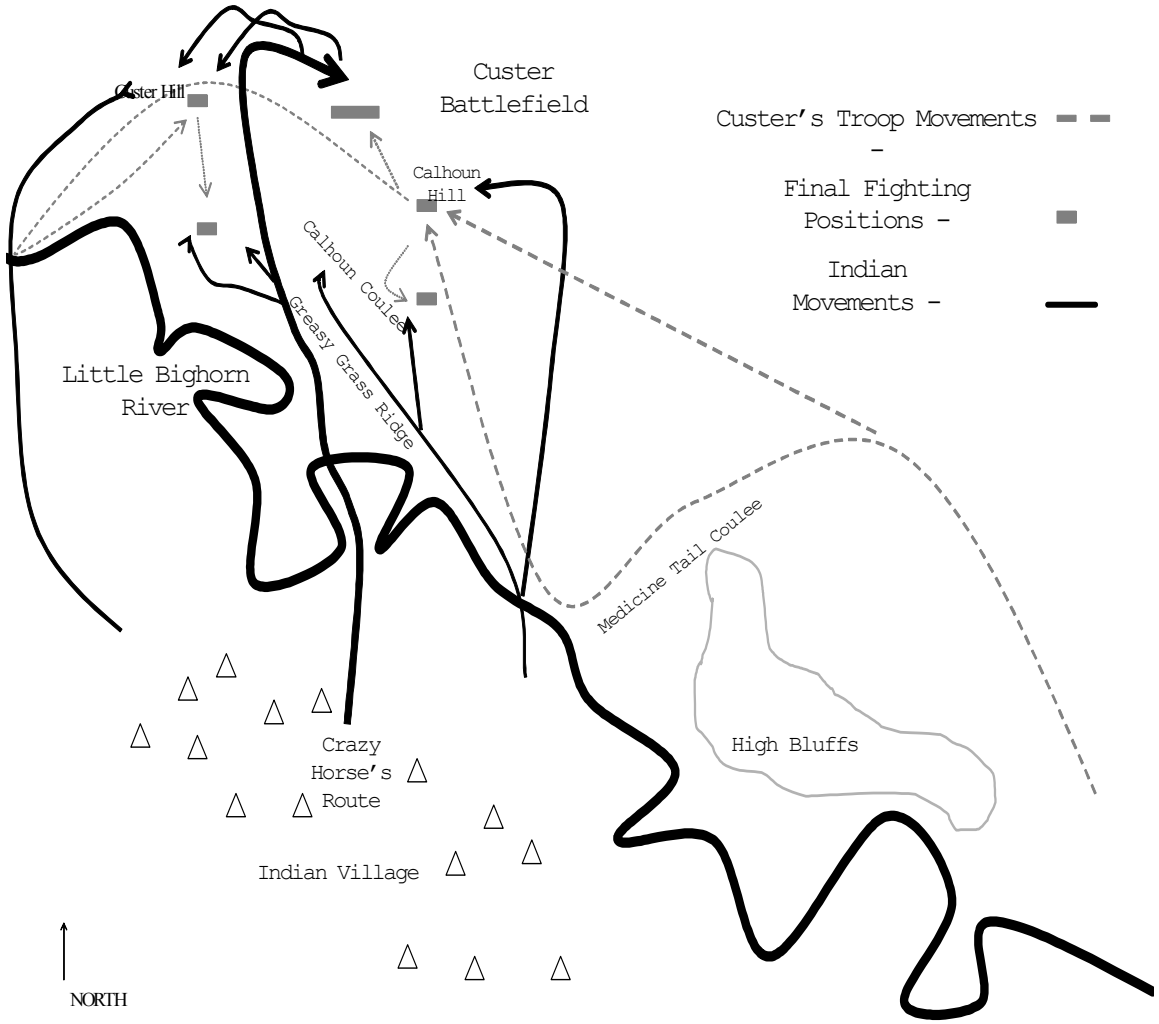


Figure 4. Actions at Little Bighorn According to Fox.

E. SUMMARY OF THEORIES

Each of the three theories has some obvious flaws that should be addressed. John Gray's theory lack's much of the evidence found in Fox's research as well as the detailed tracking of weapons across the battlefield. Steven Ambrose's theory was created prior to the discovery of archeological evidence that Fox and Gray both base much of their theories on and makes a huge strategic and tactical leap of faith with regards to Crazy Horse's abilities as a leader. Fox's work, although extremely detailed, does not account for the fact that the Indians often picked up shell casings since they often reloaded their own rounds. The Indians and their families had two days to scour the battlefield recovering their dead, stripping the soldiers of useful possessions, and most probably

picking up spent cartridge cases for future use. The two strongest theories appear to be those of Fox and Gray. The main strength in Fox's theory lies in his detailed forensic analysis of the artifacts discovered on the battlefield. Gray's main strength lays in his detailed analysis of the timeline and his attempt to piece together a minute by minute account of locations and rates of movement by studying minute clues from numerous accounts of the battle. Gray had the additional advantage or formulating his theory of what occurred after Fox had completed his archeological study and was therefore able to also use this information in reaching his conclusions. It was for this reason that we chose to model Gray's account of the battle first.

IV. JCATS RESULTS AND CONCLUSIONS

A. DIFFICULTIES ENCOUNTERED

Once the three theories were modeled into JCATS, the technical difficulties almost became overwhelming. Some of these were due to shortcomings in the program. Others were due to the fact that we were attempting to use the program for a purpose it was not originally designed to perform. A few were also due to operator error. After running the scenarios through all their iterations for the first time, we discovered that the 7th Cavalry only had 205 troopers instead of 210 and 100 Indians armed with Henry repeating rifles never fired their weapons.

The five missing cavalry troopers were quickly determined to be the four civilians accompanying Custer on his march and the battalion surgeon, Dr. George Lord. We originally planned to model these five individuals differently than the rest of Custer's troopers, but instead wound up failing to include them at all. Two of the civilians were the scouts, Mitch Bouyer and Custer's brother, Boston Custer. The other two civilians were Mark Kellogg, a reporter for the Bismarck Tribune, and Custer's nephew, Harry Armstrong Reed, often referred to as "Autie." The two scouts and Custer's nephew were most likely engaging targets with the rest of the regiment. The surgeon, however, was most likely treating wounded and the role the news correspondent played is unknown. We eventually concluded that the absence of these five individuals would have no significant effect on the outcome.

It was determined that the one hundred non-firing Indians, on the other hand, would have a very significant effect on the outcome. Fortunately, it was an easy fix. The ammunition assigned to their weapon system, the Henry repeating rifle, had been assigned a non-existent PH value. The scenarios were then once again ran through ten iterations each. This time the problem lay in the reports generated from the Analyst Workstation files. The Analyst Workstation the part of the JCATS program where one can observe and replay the engagements that have occurred. JCATS is designed to generate a series of easy to read reports based on this data. Examples of the reports

resulting from our third batch of runs are included in Appendix C. After running through the entire simulation sequence for a second time, we were not able to observe the results in the Analyst Workstation, nor were we able to generate the necessary reports. We were unable to determine the cause of this failure, but it was most likely due to the mixing up of files while moving the data among several different computers. We finally ran through the entire sequence a third time.

B. JCATS RESULTS

While analyzing the output data from the third sequence of runs, a new inconsistency was noted. While recording the ending time for each of the battles, we noticed that in some of iterations, the last person killed last was sometimes an Indian instead of a Calvary soldier. In one case, 129 Indians were killed after the last cavalry trooper. A closer analysis revealed that at the end of some of the battles, one of the cavalry troopers would continue to engage Indians even after the last trooper had supposedly been killed. We were unable to ascertain the cause of this anomaly. However, we were able to eliminate the error in output that it produced by simply disregarding all Indian casualties that occurred after the last cavalry trooper had been killed. We also based the ending time of the battle on the time that he last cavalry trooper was killed. The following tables illustrate the changes that were made. The times are represented in whole minutes and decimals, not minutes and seconds.

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Average
Ambrose	27.4	34.05	34.53	34.49	34.5	27.5	34.61	34.17	34.76	34.58	33.059
Fox	28.2	28.59	27.86	30.58	37.1	44.28	28.15	28.03	29.67	27.96	31.042
Gray	40.01	39.09	37.95	37.44	36.37	36.33	36.27	37.46	37.86	37.98	37.676

Table 2. Duration of Battle (Original)

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Average
Ambrose	27.4	27.35	27.45	27.38	27.46	27.5	27.44	27.32	27.4	27.37	27.407
Fox	28.06	28.59	27.86	27.99	27.95	44.28	28.15	28.03	29.67	27.96	29.854
Gray	36.28	37.51	37.95	37.44	36.37	36.33	36.27	37.46	37.86	37.98	37.145

Table 3. Duration of Battle (Adjusted)

The changes had the biggest impact on Ambrose's theory. Eight of the ten Ambrose iterations required adjustment. Changing the end time to the time the last cavalry trooper was killed in these eight iterations the lowered the duration from between 34 and 35 minutes to between 27 and 28 minutes. This lowered average duration of the battle by about 6 minutes from approximately 33 minutes down to 27 minutes. The next largest change occurred with Fox, which required three of the ten iterations to be adjusted. The average duration of the Fox battles was only reduced by a little over a minute, from 31 minutes down to little less than 30 minutes. Only two iterations for Gray were adjusted resulting in an overall average change of only about half a minute.

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Average
Ambrose	691	724	814	703	776	701	860	811	705	736	752.1
Fox	63	168	37	174	96	36	46	151	80	92	94.3
Gray	285	75	147	95	199	99	85	145	173	245	154.8

Table 4. Indians Killed (Original)

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9	Run 10	Average
Ambrose	691	666	692	636	711	701	731	749	641	673	689.1
Fox	62	168	37	149	32	36	46	151	80	92	85.3
Gray	279	71	147	95	199	99	85	145	173	245	153.8

Table 5. Indians Killed (Adjusted)

The adjustments did not have a significant impact in the average number of Indians killed in any of the theories. As with the duration, the largest change occurred with Ambrose. The average number of Indians killed dropped by 63, from 752.1 to 689.1. This also helped to reduce the wide range in the outcomes, but not by much. 0 shows the lowest number of Indians killed in Ambrose as 691 and the highest as 814, a range of 123. In the adjusted table, this span is reduced to 113 with a low of 636 and a high of 749. For Fox, the average is lowered by nine casualties and the range between the highest and lowest is only reduced from 138 to 134. The change is least for Gray, with the average number of Indian casualties only reduced by one and the range from

highest to lowest only reduced by two. It is also interesting to note that this range in outcomes is largest in Gray with a low of 71 Indians killed and a high of 279 in the adjusted table.

C. CONCLUSIONS

1. Outcomes of the Theories

The output data we initially hoped to use to determine which of the three theories was most plausible were to be the number of Indians killed, duration of the engagement and the location of the casualties on the battlefield. Ambrose and Fox both give slightly different estimates of the number of casualties the Indians suffered. Fox is less precise in his estimate that the Indians sustained 30 to 100 casualties while Ambrose places his estimate right at 40. Gray makes no estimate of Indian casualties.

We decide to us the number 40 as our benchmark for two reasons. First, it is the most widely quoted number in the abundant literature on the subject. Two Indian accounts of the battle in National Park Service literature describing the battle place their number killed at about the same figure. An Indian named Low Dog stated 38 Indians were killed while Chief Gall stated 43 died in the battle (Utley). Additionally, it falls within the parameters of both authors who ventured an estimate. We expected the number of Indian casualties in the simulation to run a bit higher than what may have occurred during the actual battle. Although JCATS has input variables used to degrade marksmanship accuracy due to human factors, these factors can never be fully accounted for.

Although we expected a higher number of Indian casualties in the simulations than what actually occurred during the battle, the extraordinarily high number of Indians killed in Ambrose's theory of what occurred greatly exceed what plausibly could have occurred in all ten of the simulations ran. The lowest number of Indians killed was 636. This far exceeds Ambrose's own estimate of 40 Indians killed. All but three of the test runs for Fox's theory fall within the parameters of his estimate of 30 to 100 Indians killed. Gray made no estimate of the number of Indians killed, but the results from the test runs of Gray's theory averaged 153.8 Indians killed, with a high of 279. The lowest number killed while running Gray's scenario is 71, almost double the estimate from the

Indian accounts. Fox is obviously the clear winner in this category with three of the runs resulting is Indian casualties of 32, 36, 37, and 46; extremely close to the Indian accounts.

The three authors estimated that Custer's part of the battle lasted approximately one hour. Ambrose states less than an hour, Fox states about an hour, and Gray, with his detailed time analysis, estimated one hour and seven minutes. We set our benchmark at one hour. If one accepts the expectation that the Indians would suffer more casualties due to the inability of a computer program to properly compensate for all of the human factors that degrade marksmanship in combat, one should also reasonably expect that the duration of the engagement would be shorter in the simulation than in the actual battle. In all three scenarios, all iterations concluded in less than our benchmark of one hour. The duration of the Ambrose scenario was extremely consistent. Converting the decimal figures to minutes and seconds, one sees that all ten iterations ended at between 27:11 and 27:30, a span of only 19 seconds. Gray is slightly less consistent with a range across all ten iterations of only 1 minute and 43 seconds ranging from 36:16 to 37:59 when converted. Fox has a range 1 minute and 48 seconds for nine of the iterations ranging from 27:52 to 29:40 when converted to minutes and seconds. Run number six as shown in 0 is an outlier where the battle lasted 44 minutes and 17 seconds. Time wise, this outlier comes closest to our benchmark of one hour than any of the other iterations ran. What makes this even more remarkable is the fact that number of Indian casualties in this iteration was 36. Only one other iteration was closer to our benchmark of 40, run number three of Fox with an Indian casualty count of 37.

The cavalry casualties in this same iteration, number six of Gray, also seemed to resemble the layout of the grave markers on the actual battlefield quite well. Unfortunately, JCATS does not have the ability to capture screenshots. This is one of the reasons we eventually decided to forego using the final layout of the dead cavalry troopers as one of our criteria. All three scenarios resulted in the casualties being spread out in the close proximity to the pattern we expected to see. Although some looked closer than other, the results would simply be too subjective without a detailed analysis of the precise location of the dead soldiers in the simulation with respect to the location of

the actual grave markers on the battlefield. Fox includes a very detailed map with the location of the grave markers and the artifacts he found in the back of a book he coauthored with Douglas D. Scott detailing the archaeological work they conducted in 1984. Unfortunately, this map bears no grid coordinates or reference points of any kind. This was most likely a conscious omission designed to prevent unauthorized persons from scavenging the sites. However, it also precludes us from using it for comparison against the results of our simulations.

Given the results of the simulations we ran, the results of the Fox theory seemed to most closely resemble the results of the actual battle. Although the average duration of the battle was only half that of our one hour benchmark, the average number of Indian casualties came the closest to our benchmark of forty with four of the ten iterations coming remarkably close to matching that of the actual outcome. Also, as mentioned before, one of those four iterations was the outlier with a duration of 44 minutes and seventeen seconds, the closest any of the runs came to matching the estimated one hour of the actual battle. Gray's theory came in a close second. With an average duration of 37 minutes and 9 seconds, it came closest to matching the actual results in the category of time. However, its average of 154 Indian casualties was nearly four times the number of those estimated to have been killed in the actual battle. Ambrose's theory, while very close to the other two in duration, simply incurred far too many Indian casualties to even be considered. It is interesting to note that these findings coincide perfectly with those of LT Burns in his original thesis, whose work led to this study.

2. JCATS as a Tool

As stated in the beginning, our primary purpose for this work was to carry on the work of Lieutenant Burns and attempt to determine which of these three theories was most plausible. However, we also hoped that our work would shed some light on the feasibility of using combat modeling to conduct After Action Reviews (AARs) of past battles where individual variable could be tweaked to see how they would have impacted the outcome.

Our first observation is that this will work best for battles where more details of what occurred are known. JCATS usefulness as a tool to extrapolate unknown facts is

limited, especially in cases like the Battle of Little Bighorn, where the few recorded facts available are far outweighed by what is unknown. Second, anyone using JCATS to prepare for real life missions should be made aware that the default ballistics data for pre-programmed weapons systems in the database are not based on any scientific calculations. In fact, some of the default settings defy common sense by giving a shooter a better chance of hitting a target that is moving than one that is stationary. Finally, the best thing about JCATS, its ability to let the user model individual combatants in detail, is also one of its greatest liabilities when used for modeling past battles, especially large scale engagements. It is very difficult to program the movements of large numbers of individuals, and nearly impossible when that movement depends upon the action of the opposing force.

This is not a factor when using JCATS on a network with live individuals sitting at stations who are able to input actions based upon what the enemy and other friendly forces are currently doing. However, it is a factor when programming a scenario to run multiple iterations for statistical analysis. The action an individual soldier may take when the buddies on his left and right are performing optimally may be distinctly different from that taken when the buddies on his left and right have been wounded or killed, or at least it should be. Unfortunately, these differences in behavior are difficult to model with any degree of accuracy without a live person monitoring the action and inputting commands as the situation evolves. Even with this being the case, it is imperative that the different actions a soldier may take be programmed into the scenario for the sake of consistency. While running multiple iterations run with live people setting at the controls influencing the events of the battle may be easier to program and allow for a wider range of options in the behavior of the modeled combatants, one would have to be suspicious of the results of any data obtained. It may sound counterintuitive that a human being at the controls should not be used to replicate the human variable factor, but if we are to isolate one variable for analysis, the other variables must be able to be made consistent over multiple iterations. If this were not the case, who would be able to the say that the results of any one battle was not due to an operator at a terminal turning around to ask someone to get him a cup of coffee at a critical juncture in the battle?

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IV. RECOMMENDATIONS FOR FUTURE RESEARCH

Although some of our work was limited due to the capabilities of JCATS, much more of it was limited by time. There are many things that we would have liked to have done, or done again differently, if we had had more time. Some of the things are minor, such as adding the battalion surgeon and four civilians to bring the total of Custer's force to 210, instead of 205. Also, if we had it to do over again, we would space out Indian a bit more. They tended to clustered together quite a bit in our simulations, especially when grouping formations overlapped. Additionally, although we initially tried to incorporate the horses into the scenarios by modifying the maneuver ability and load capacity of a truck, we soon abandoned this approach due to the complexities it introduced. This is a detail more suited to an individual with more time and expertise than either one of the authors of this thesis were able to bring to bear on the problem. However, these are all merely refinements to the setup.

The most interesting potential for future work lies in experimenting with the "what if" scenarios. What if Custer had taken the two extra companies he was offered with him? What if Custer had taken the Gatlin guns? What if he had not split his forces up? Changing variable such as these are where the real benefits of computer combat modeling come into play. It permits a person to change only one aspect of a battle to see what effect that one variable may have on the outcome.

There are many who would consider contemplating the various "what if" scenarios as a waste of time due to the difficultly in isolating just one variable. Take the Gatlin guns for instance. If Custer had taken them, they would have slowed him down. In fact, this is the very reason that he did not take them. One could argue that experimenting with what may have occurred if he had had them with him is a moot point because if he had taken them, he never would have arrive there in time to catch the Indians. Also, the Indians very like would not have fought so aggressively when faced with the additional firepower. These are valid arguments, but they miss the point. The point is not to merely see how things may have turned out differently in this particular

instance, but to see the effect that variable has so that it's value may be assessed in future operations. While we are well aware that Gatlin guns are no longer part of the current unit equipment, the same issues may be a consideration when a patrol leader is trying to decide whether or not to take the platoon M-60 machine guns on a particular mission. Unfortunately, we were unable experiment with any of the "what if" scenarios we considered due to the time consumed by the numerous technical difficulties we encountered.

Also in hindsight, we feel it may have been better to replace Ambrose's theory with that of Gregory F. Michno's in his book titled "Lakota Noon". His book is based primarily on details taken from Indian accounts of the battle. It includes very detailed maps of his version of events depicting the action in fifteen minute increments.

APPENDIX A. WEAPONS DATA

A. CAVALRY WEAPONS

The first thing that needed to be determined was the number of combatants on each side and the types of weapons they used. For the 7th Cavalry, this task was relatively easy. Custer's force of five companies consisted of 206 soldiers and 4 civilians. The standard weapons of issue for each soldier were the Model 1873 Springfield "Trapdoor" Carbine and the Model 1873 Colt Single Action Army (SSA) revolver. There were a few notable exceptions such as Remington .50 caliber sporting rifle and pair of Webley British Bulldog revolvers said to be carried by Custer or the .50 caliber Springfield rifle carried by Captain Thomas French of M Company, but these were rare exceptions and were not modeled into the JCATS database (Shulman, 1998).

"Going into battle on June 25, each man was supposed to have one hundred rounds of carbine ammunition and twenty-four pistol cartridges (counting six in the revolver) divided between his person and his saddle bags" (Hutchins, 1976, p. 30). This data was entered into JCATS as were the reload rates. For the carbine, John S. Du Mont's book titled *Custer Battle Guns* gives a rate of fire of twelve to thirteen rounds per minute. Testing conducted by the Army in 1879 gave a rate of fire of 29 shots in two minutes, or 14.5 shots per minute (Ordnance Notes No. 115). However, this was on a sterile firing range with none of the distractions of combat. We decided the lower rate of twelve rounds per minute to be more appropriate for the simulation. This divides out to a six second reload time.

We were unable to obtain data for the reload time of the revolver. However, the 1873 Colt SAA was not designed for fast reloading. The Army wanted the sturdiness of a solid frame. This meant that instead of breaking open for reloading, the Colt SAA was reloaded from a swing out gate on the right side of the cylinder. Each expended round had to be manually extracted prior to inserting a fresh round. With practice, the process could probably be accomplished in about thirty seconds. An article by James S. Hutchins titled "Captain Michaelis Reports on Army Weapons and Equipment on the Northern

Plains, 1876-1879" is a compilation of reports given by Captain Otho Ernest Michaelis, the Chief Ordnance Officer for the Military Department of Dakota. An 1877 report by Captain Michaelis seems to indicate that the reload time of the revolver was of little concern to the soldiers who carried them. He wrote:

> This arm is the weapon of an *instant*; the question of extraction and reloading does not, in my opinion, enter in any way into the problem….After the weapon has exhausted its resources, it is a matter of small concern to the hard-pressed soldier, whether it will take him thirty or sixty seconds to reload. He is lost in any event, and his final effort will be made in hurling his pistol at the head of his nearest foe.

This quote is taken from a part of the report when Captain Michaelis is defending the Colts as more reliable weapons than the Schofield Smith and Wesson revolvers whose "only claim to superiority over the Colt's is founded upon their capability of automatic extraction" (Hutchins, 1998). This would seem to indicate that the thirty versus sixty second reload times he refers to is a comparison between the Schofield Smith and Wesson and the Colt SAA with the Colt SAA having a reload time of about sixty seconds. Although both authors are experienced pistol marksmen, lacking any specific experience with the Colt SAA, we decided to defer to Captain Michaelis' estimate, even if made offhandedly, and program a reload time of sixty seconds for the revolver.

B. INDIAN WEAPONS

Unlike the cavalry, the Indians had no Ordnance Corp and were not equipped with any standard type of firearm. Instead, they utilized a wide variety of weaponry. How many different types of weapons were used? Fox's study found bullets or weapons fragments from 23 different types of firearms in addition to the Springfield carbine and Colt revolver used by the Army (1987, p. 109). Fox went on to compare these findings to the types of weapons identified in an earlier study by former battlefield historian B. William Henry. Henry's study had identified 13 different types of firearm. Fox found that 10 of the 13 were the same as those that he had found. However, Henry's had also found evidence of 3 types of firearms that Fox had not discovered. Adding these 3 to

Fox's 25 brings the total number of known firearms types to 28, including the Army weapons. Fox also found eight arrowheads and a fragment from a ninth corroborating historical accounts that many of the Indians were armed with bows and arrows.

After identifying as accurately as possible the types of weapons used, Fox went on to examine each bullet and cartridge case in excruciating detail in an effort to try to identify the number of different weapons of each type. By examining the firing pin and extractor marks on the shell casings, Fox was able to identify 69 different Model 1873 Springfield carbines used in the battle accounting for almost a third of Custer's forces. As for the Indian weapons, Fox found evidence of 119 different firearms. The most common was the .44 rimfire fired by the Model 1866 Winchester and Henry repeating rifles. He found evidence of 55 individual weapons of this type. Next came the .50/70 caliber round fired by the Sharps and Springfield rifles. There were 30 individual weapons of this type accounted for, 25 Sharps and 5 Springfields. The third most common was another Winchester repeating rifle, the .44/40 round fired by the Model 1873, with 7 individual weapons identified. These three categories accounted for 92 of the 119 distinctly different weapons identified.

Fox then attempted to extrapolate the total of number of Indian weapons present at the battle by a statistical comparison. He reasoned that if evidence of 69 (32.2%) of the 210 Army weapons known to be present at the battle was found, then it stood to reason that evidence of the 119 Indian weapons found should only account for about 32.2% of the Indian weapons present at the battle. This calculates out to an estimate of 370 Indian firearms. Their 32.2% figure also coincides with the results of an experiment they conducted to test the representative sample size of artifacts they had collected. They did this by selecting three 100 square meter areas of the battlefield that had already been searched and conducted a second systematic and much more thorough search of these three areas. For their sample they selected one area where a large number of artifacts had been discovered, one where very few had been discovered, and one where they had obtained average results. They found that their second search led to the discovery of about twice as many items as the first search. This would seem to indicate that their search probably only discovered about one third of the artifacts there were to be found.

Fox and Scott then point out that the 370 figure is a conservative estimate for two reasons. First, most of the rounds from muzzle-loaded weapons could not be identified as coming from individual weapons because they did not use metallic cartridge cases which could be examined for distinct firing pin and extractor markings. Therefore many rounds attributed to only one individual weapon in all likelihood came from several different weapons of the same type. If these rounds could have been further differentiated, it would have significantly increased the number of individual weapons identified. Second, although all the positions of Custer's men were within the area that Fox's team examined, many of the positions that the Indians fired from lie outside the boundaries of that area. Taking these two factors into account leads to the conclusion that the number of Indian firearms present was much higher than 370.

Although there are several different estimates from survivors of the Reno-Benteen portion of the battle as to the number of Indian warriors present that day, ranging from 1500 up to 9000, only one addresses the breakdown of how the Indians were armed. Scott and Fox quote Charles Windolph of Company H as estimating "that fully half the warriors carried only bows and arrows and lances, and that possibly half the remainder carried odds and ends of old muzzle-loaders and single shot rifles of various vintages. Probably not more than 25 or 30 percent of the warriors carried modern repeating rifles" (1987, p. 112). In another article Scott wrote with Melissa A. Connor titled "Post-mortem at the Little Bighorn", Scott obviously combines the results of the archeological study with Windolph's estimate. He speculates

> that if 1,500 Indian warriors took part in the battle…, then about 375 would have been armed with muzzle-loaders and single-shot rifles such as Sharps and Ballards, and about 192 would have been armed with repeating weapons. The rest may have used bows and arrows and a few old pistols and revolvers.

While we have attempted to be as precise as possible, we must acknowledge that there are several considerations that we have purposely omitted. For example, the 32.2 percent figure Scott and Fox arrive at by dividing the 69 Model 1873 Springfield carbines they found evidence of by the 210 soldiers known to have died in the battle fails to take into account the fact that not all 210 of those soldiers carried that weapon. As stated

earlier, there were a few exceptions. Nor does it account for the fact that some of the 69 individual weapons of this type identified may have been Indian weapons captured from General Crook's forces at the Battle of Rosebud eight days earlier. The bottom line is that although we have attempted to be precise in our calculations, the results can only be as precise as the data entered into the simulation.

C. BALLISTICS DATA AND COMPUTATIONS

The data that required the most time for calculation was that of each weapon's accuracy. Unfortunately, the curator of arms at the West Point museum was reluctant to let us take any of the historical weapons they have on display there out to firing range to conduct our research. He was, however, very helpful in pointing us to relevant information sources. The most useful was a copy of *Ordnance Notes No. 115*. It was a report published by the Ordnance Office of the War Department in 1879 comparing the accuracy of captured Indian weapons and those of the U.S. Army. Two captured Sharps .44 caliber rifles were tested against a Springfield rifle and a captured Winchester repeating rifle was compared against the Springfield carbine. The Winchester and Springfield carbine were fired at targets 300 and 600 yards away. The two Sharps and Springfield rifle were fired at targets located 500, 800, and 1000 yards away. The mean horizontal and vertical deviation for each weapon at each range was recorded. This data was used to calculate the probability of each weapon hitting a man-sized target at each of the different ranges. The standard target chosen to represent this was the "Iron Maiden" which is very similar in appearance to the "E" type silhouette used by the U.S. military in marksmanship training. The dimensions for this target are given in Figure 5.

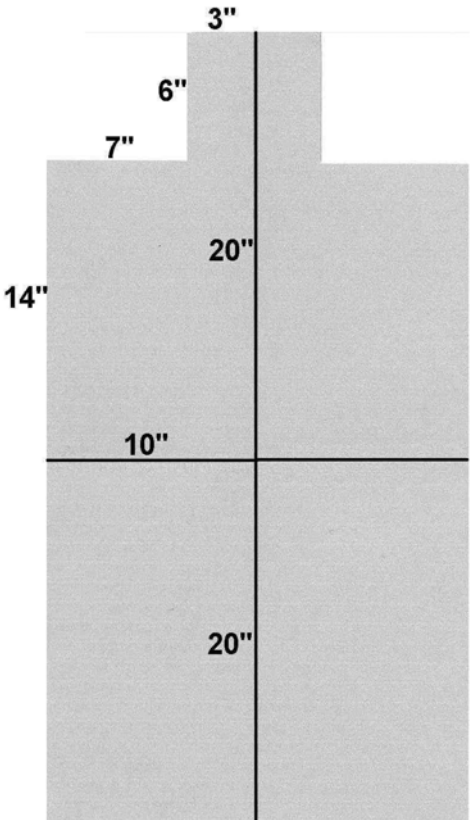


Figure 5. "Iron Maiden" Target

Next, a template was created to calculate the probability of each weapon's ability to hit a target of a given size at various ranges using the mean horizontal and vertical deviation numbers obtained from the weapons testing conducted in 1879 and documented in *Ordnance Notes No. 115*. The template was created using a variation of standard deviation called "probable error". "A probable error (abbreviated PE) may be defined as a distance such that exactly 50 percent of the rounds fall within the interval [-PE, PE]" (Mansager, Probable Error Class Notes). This means that for a given weapon aimed at a fixed point, the PE is the distance from that fixed point, either horizontally or vertically, that 50 percent of the shots would be expected to fall within. Figure 6 illustrates horizontal probable error. For a properly sighted weapon aimed at the fixed point at the

center of the target, 25 percent of the shots fired would be expected to hit within one probable error to the left of center between lines A and B and 25 percent would be expected to hit within one probable error to the right of center between lines B and C.

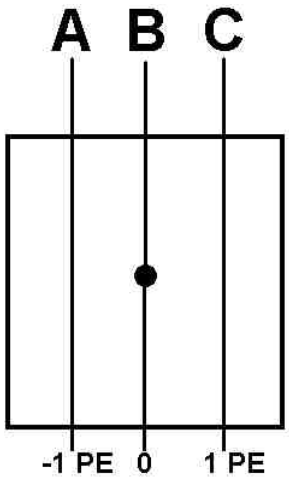


Figure 6. Horizontal Probable Error

Of the remaining 50 percent, 25 percent would be expected to hit left of line A and the other 25 percent to the left of line C. They are uniformly distributed in the shape of a bell curve and can be further sub-divided so that practically 100 percent of the shots are accounted for within four probable errors on either side of the point of aim as shown in Figure 7.

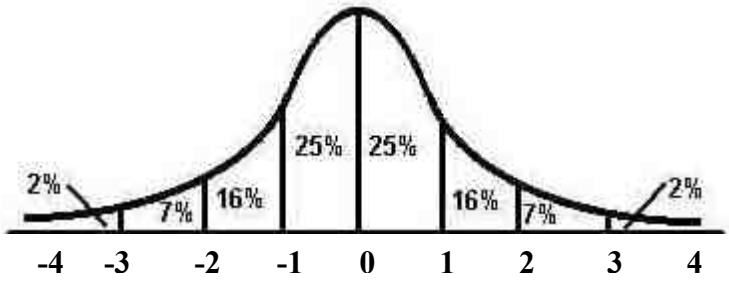


Figure 7. Bell Curve Distribution

The same pattern of distribution occurs vertically as well, although the distance that is represented by each vertical PE may or may not be equal to the distance represented by each horizontal PE. Although the distribution within a PE region is not uniformly distributed, it is standard practice to alter the shape of the bell curve to the bar graph represented in Figure 8. This sacrifices a small degree of accuracy for ease of calculation. Next, by combining the horizontal and vertical PE into one graph, the matrix in Figure 9 is obtained. The PE within each square is calculated by multiplying the horizontal and vertical PE at that intersection point. Next, by adjusting the matrix for each weapon so that one horizontal PE is equal to the mean horizontal deviation at a given range, and one vertical PE is equal to the mean vertical deviation at that same given range, the matrix can them be superimposed on the "Iron Maiden" target to calculate the weapon's probability of a achieving a hit at that range.

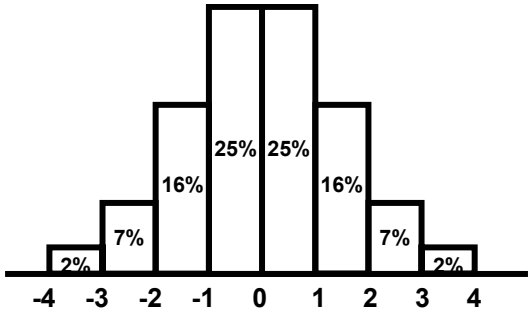


Figure 8. Bell Curve Converted to Uniform Distributions within a PE Region

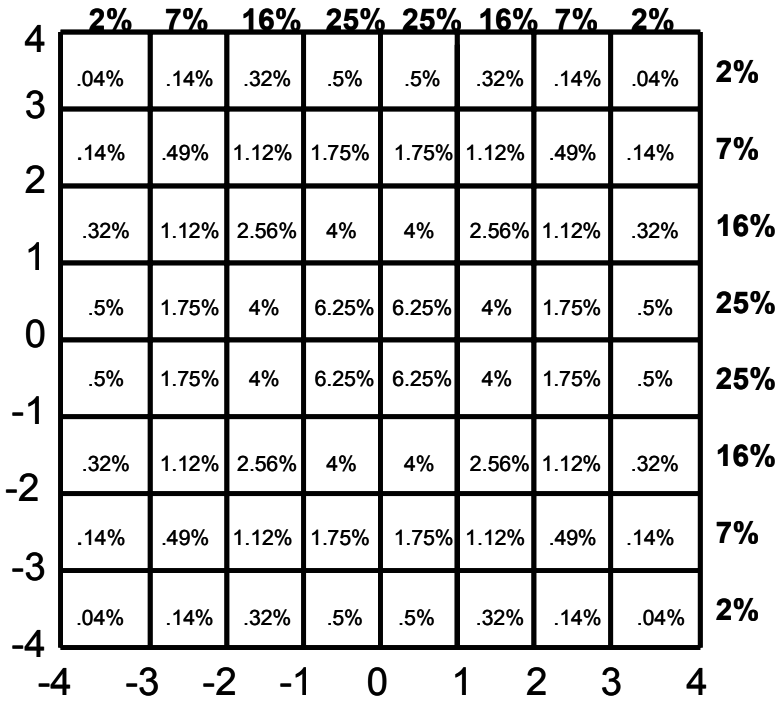


Figure 9. Probable Error Matrix

Figure 10 illustrates the PE matrix for the Model 1873 Springfield "Trapdoor" Carbine superimposed on an "Iron Maiden" target at a range of 300 yards. The matrix is rectangular because the horizontal deviation is greater than the vertical deviation. Each of the red rectangles measure 5.5", the mean horizontal deviation, by 2.3", the mean vertical deviation. One can calculate the probability of hitting (PH) a target of this size at this range merely by adding up the percentages in the corresponding rectangles on the target. Rectangles not completely on the target are calculated by interpolating how much of their area is covered within the target area and the corresponding probabilities. However, because in this case the maximum vertical deviation does not exceed the target size, the PH can be calculated using only the horizontal deviation. Also, because the target is symmetrical, the values can be calculated for just one half of the target and then multiplied by two. The two horizontal column from 0 to 1PE is completely contained within the target and accounts for 25% of the shots fired. The next column, 1PE to 2PE accounts for 16% of the shots fired. However, not the entire column is within the target area. Only 4.5" of the 5.5" are on the target. One must first divide 4.5 by 5.5 to get .818,

and then multiply 16% by .818 to calculate 13.09% of this second column covering the target. Adding this to the first column's 25% totals 38.09% of the hits occurring on one half of the target. If one multiplies this number by two to account for both halves of the target, it yields 76.18% for the probability of the Model 1873 Springfield "Trapdoor" Carbine hitting a target with the dimensions of "Iron Maiden" target at a range of 300 yards.

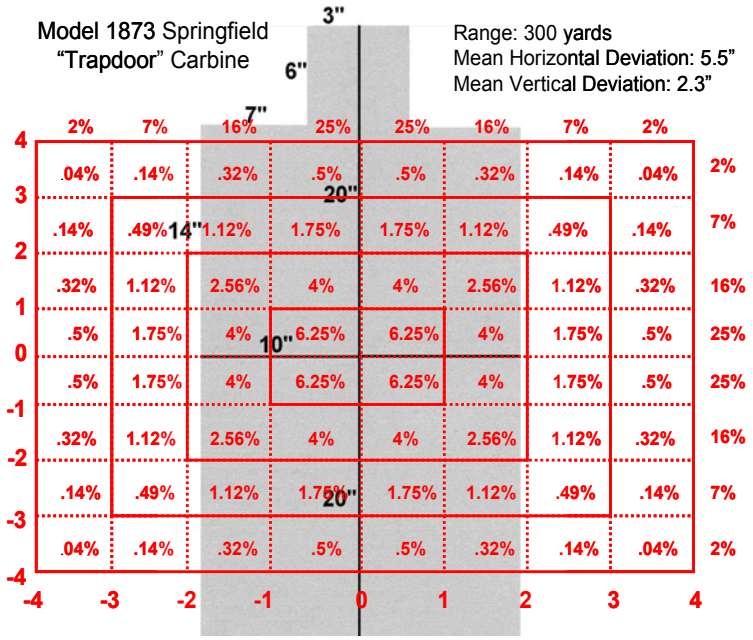


Figure 10. PE matrix Superimposed on 300 Yard "Iron Maiden" Target

Increasing the range to 600 yards increases the size of each rectangle which makes the target appear smaller when compared to the PE matrix. With the size of each rectangle increased to a width of 15.5", the mean horizontal deviation at 600 yards, and a height of 7.3", the mean vertical deviation at 600 yards, none of the rectangles fall completely within the target. They must are be calculated as a percentage of the total area. The PH for the Model 1873 Springfield "Trapdoor" Carbine at 600 yards works out to be 28.32% as illustrated in Figure 11.

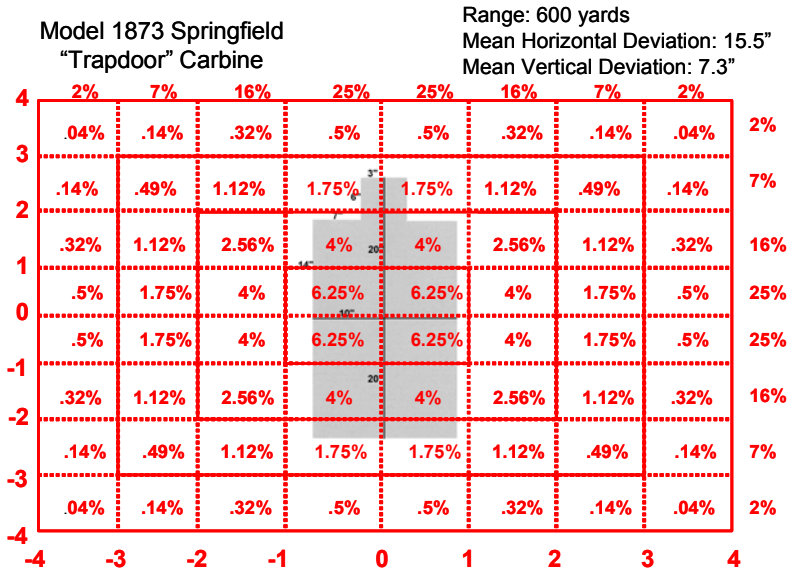


Figure 11. PE Matrix Superimposed on 600 Yard "Iron Maiden" Target

The same steps were also taken for each of the three Indian weapons listed in *Ordnance Notes No. 115*. These consisted of one Winchester and two Sharp's rifles. The Winchester was the .44 caliber Model 1866 repeating rifle and it was compared to the 1873 Springfield carbine for accuracy. The Sharp's rifles were .44 caliber breech-loaders and these were compared to the 1873 Springfield rifle for accuracy. The mean deviation data in Table 6 and Table 7 was taken from *Ordnance Notes No. 115*. The data in these tables was used to calculate the PH data for the "Iron Maiden" targets.

	300 Yards					600 Yards				
	Mean Horizontal Deviation	Mean Vertical Deviation	Mean Absolute Deviation	PH for "Iron Maiden"	PH for "Iron Maiden" (Prone)	Mean Horizontal Deviation	Mean Vertical Deviation	Mean Absolute Deviation	PH for "Iron Maiden"	PH for "Iron Maiden" (Prone)
1873 Springfield Carbine	5.5"	2.3"	6"	76.18%	66.16%	15.5"	7.3"	17.1"	28.32%	14.36%
1866 Winchester Rifle	7.1"	5.2"	8.8"	61.08%	36.92%	12.4"	15"	19.5"	22.50%	7.26%

Table 6. Winchester vs. Springfield Carbine

	300 Yards	500 Yards					800 Yards					1000 Yards				
	Mean Horizontal Deviation	Mean Horizontal Deviation	Mean Vertical Deviation	Mean Absolute Deviation	PH for "Iron Maiden"	PH for "Iron Maiden" (Prone)	Mean Horizontal Deviation	Mean Vertical Deviation	Mean Absolute Deviation	PH for "Iron Maiden"	PH for "Iron Maiden" (Prone)	Mean Horizontal Deviation	Mean Vertical Deviation	Mean Absolute Deviation	PH for "Iron Maiden"	PH for "Iron Maiden" (Prone)
1873 Springfield Rifle		5.3"	9.4"	10.8"	61.14%	29.52%	13.2"	15.5"	20.3"	20.56%	8.44%	6.3"	19.3"	20.4"	31.84%	14.20%
Sharp's Rifle No. 1		10.7"	8.8"	13.9"	37.34%	18.20%	18.5"	27.8"	33.4"	8.70%	3.34%	22.3"	7.7"	23.6"	19.14%	9.60%
Sharp's Rifle No. 2		9.9"	10.2"	14.2"	37.30%	17.02%	39.2"	8.5"	40.1"	10.36%	5.08%	14.3"	30.2"	33.4"	10.36%	3.12%

Table 7. Sharp's vs. Springfield Rifle

The data for the prone "Iron Maiden" target shown in Figure 12 was calculated in the same manner using a shorter version of the target to simulate a person lying in the prone position. All dimensions were the same except for the overall height which was reduced from 40 inches to 18 inches. A higher PH may have been obtained by using a lower point of aim as center mass. However, as it turned out, the calculations for a prone target were not required. JCATS has a setting that allows the user to input the size of a target in both the prone and standing position which negates the need for a separate PH ratio. This calculation is listed in Tables 2 and 3 solely for the purpose of comparison. The most interesting thing to note is that the difference in the accuracy of the Springfield carbine and the Winchester rifle becomes much more dramatic when firing at a prone target.

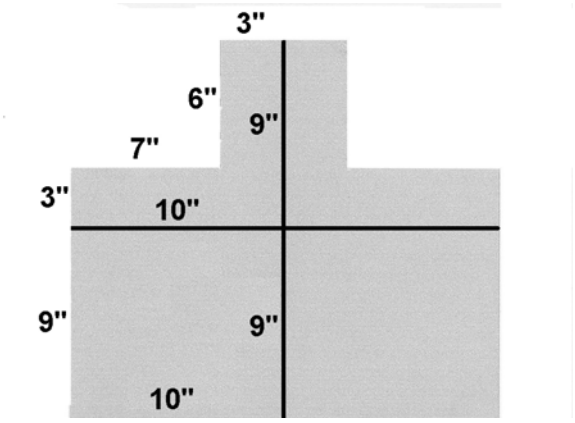


Figure 12. "Iron Maiden" Target (Prone)

Overall, we were quite confident in the reliability of our data as far as the ballistics characteristics of the weapons systems by themselves were concerned. We were not quite as confident when it came to calculating other factors such as degradation of accuracy due to engaging moving targets or while moving one's self. This is due to a serious lack of hard data on the subject. The default JCATS values are not based on any scientific research and have not even been scrubbed to check for relative consistency, as in the example noted earlier where some weapon systems are assigned a higher probability of hitting a target that is moving than one that is stationary. Even the U.S. Army Marksmanship Unit and the staff at the moving target range facility at Fort Benning were unable to provide the needed data. This is a shortcoming that needs to be addressed if one hopes to achieve credible results from combat modeling programs such as JCATS.

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APPENDIX B. JCATS INPUT VARIABLES

We ran our simulations utilizing the Joint Conflict and Tactical Simulation (JCATS Version 4.1.0) software on a Linux 7.3 Operating System powered by a Pentium 4, 2.53 GHz computer with 754mb of Random Access Memory. The following are the parameters and settings used for our simulations. Each of the simulations contains the same base information pertaining to Task Organization, Systems, Weapons, Munitions, and PH/PK tables. Theory specific information such as TF location and direction of attack is listed at the end of this annex.

A. TASK ORGANIZATION

Our task organization is based on 1500 Indian warriors with a weapon cross distribution based on the archeological data discovered by Richard Fox. Since there are no records indicating where each warrior was located on the battlefield and the Indian forces were not organized by weapon type we decided to develop equal sized task forces for control purposes. We started with the following distribution listed in Table 9 below as per the archeological information and then divided the numbers into 24 groups. Each of the rifle types were divided into 12 Indian groups and the Bow and Arrow warriors were divided into 12 Indian B&A groups.

Weapon	Magazine Capacity	Muzzle Velocity	Max Effective Range	Number of Indians
1860 Henry	15	1167	250 yards	100
1866 Winchester	15	1167	250 yards	100
1873 Winchester	15	1310	450 yards	25
Sharps .50 cal	1	1375	500 yards	80
Springfield .50 cal	1	1345	500 yards	15
Rifled Muzzleloader	1	1375	500 yards	140
Smooth Bore Muzzleloader	1	1375	100 yards	140
Bow and Arrow	1		30 yards	850
1873 Springfield	1	1126	500 yards	50

Table 8. Indian Distribution

1. Indians (Red)

INDIANS TF1
- 1/Indians
- 1/B&A/Indians
- 11/Indians
- 11/B&A/Indians

INDIANS TF2
- 2/Indians
- 2/B&A/Indians
- 12/Indians
- 12/B&A/Indians

INDIANS TF3
- 3/Indians
- 3/B&A/Indians

INDIANS TF4
- 4/Indians
- 4/B&A/Indians

INDIANS TF5
- 5/Indians
- 5/B&A/Indians

INDIANS TF6
- 6/Indians
- 6/B&A/Indians

INDIANS TF7
- 7/Indians
- 7/B&A/Indians

INDIANS TF8
- 8/Indians
- 8/B&A/Indians

INDIANS TF9
- 9/Indians
- 9/B&A/Indians

INDIANS TF10
- 10/Indians
- 10/B&A/Indians

2. Cavalry (Blue)

CAVALRY TF1

HQ/7th Cavalry - 5 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

CAVALRY TF2

1/C/7th Cavalry - 12 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

2/C/7th Cavalry - 14 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

3/C/7th Cavalry - 12 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

CAVALRY TF3

1/E/7th Cavalry - 12 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

2/E/7th Cavalry - 14 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

3/E/7th Cavalry - 12 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

CAVALRY TF4

1/F/7th Cavalry - 12 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

2/F/7th Cavalry - 14 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

3/F/7th Cavalry - 12 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

CAVALRY TF5

1/I/7th Cavalry - 12 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

2/I/7th Cavalry - 14 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

3/I/7th Cavalry - 12 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

CAVALRY TF6

1/L/7th Cavalry - 16 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

2/L/7th Cavalry - 16 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

3/L/7th Cavalry - 16 x Cavalry with Springfield 1873 Trapdoor & Colt 1873 Revolver

B. PROBABILITY OF HIT (PH) AND PROBABILITY OF KILL (PK) TABLES

1. Probability of Hit Tables

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
23	75	65	55	20
46	50	40	30	10
92	0	0	0	0

Table 9. Bow and Arrow

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
23	75	65	55	20
46	50	40	30	10
92	0	0	0	0

Table 10. Colt 1873 Revolver

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
75	80	40	30	20
125	70	27	17	0
185	58	19	0	0
275	40	0	0	0
550	0	0	0	0

Table 11. Henry 1860

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
75	87	44	34	20
125	82	32	22	0
185	75	24	0	0
275	66	0	0	0
455	37	0	0	0
730	10	0	0	0
910	0	0	0	0

Table 12. Rifled Muzzleloader

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
75	79	40	30	20
92	75	33	23	0
125	66	19	9	0
185	50	16	0	0
275	0	0	0	0

Table 13. Smooth Bore Muzzleloader

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
75	87	44	34	20
125	82	32	22	0
185	75	24	0	0
275	66	0	0	0
455	37	0	0	0
730	10	0	0	0
910	0	0	0	0

Table 14. Sharps .50 Cal

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
75	87	44	34	20
125	82	32	22	0
185	75	24	0	0
275	66	0	0	0
455	37	0	0	0
730	10	0	0	0
910	0	0	0	0

Table 15. Springfield .50 Cal

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
75	90	45	35	20
125	88	34	24	0
185	82	26	0	0
275	76	0	0	0
550	28	0	0	0
700	0	0	0	0

Table 16. Springfield 1873 Trapdoor

Range (m)	SSEF	SMEF	MSEF	MMEF
0	95	85	75	40
75	86	43	33	20
125	80	31	21	0
185	72	23	0	0
275	61	0	0	0
550	22	0	0	0
700	0	0	0	0

Table 17. Winchester 1866

2. Probability of Kill Table

All of the weapon systems use the same PK Table as they are similar in capability. Each of the categories is by design the same value. We controlled the ratio by weighting the values of probability in the direct fire section of the Parameters section in the Vista editor.

Range (m)	MOBEF	FRPEF	MOFEF	KKEF
0	95	95	95	95
100	85	85	85	85
200	75	75	75	75
300	65	65	65	65
400	55	55	55	55

Table 18. All Weapons

C. SYSTEM SPECIFIC DATA

Defilade Exposure
Partial Defilade 0.5 meters
Full Defilade 0.1 meters

	Weapon	Munitions	# of Rounds
Cavalry			
	Springfield 1873	Springfield .45 Cal	100
	Colt 1873	Colt 1873	12
Indians			
	Winchester 1873	Winchester 1873	30
	Springfield .50 Cal	Springfield .50 Cal	30
	Henry .44 Cal	Henry .44 Cal	30
	Rifled Muzzleloader	Springfield .50 Cal	30
	Sharps .50 Cal	Springfield .50 Cal	30
	Smooth Bore Muzzle	Springfield .50 Cal	25
	Springfield 1873	Springfield .45 Cal	30
	Winchester 1866	Winchester .44 RF	30

Table 19. Stations (Weapon Assignment and Ammunition)

Casualty Play
Damage Class: Troop
Medical Capability: None
Soldier Characteristics
Weight: 185 lbs.
Volume (m^3): 1
Peripheral Acquisition: 100%
Fatigue Parameters
Class Name: Normal Trained (for all Cavalry)
Ill Trained (for all Indians)
Energy Level: Maximum Calories 3000
Initial % of Max: 61

	Prone	Crouching	Standing
Silhouette (m2)	0.25	0.8	1.8
Height (m)	0.25	0.8	1.75
Slow Speed (km/hr)	1	3	5
Medium Speed (km/hr)	1.5	4	6.5
Fast Speed (km/hr)	1.7	5	9
Max Speed (km/hr)	2	6	12

Table 20. Posture Table

D. THEORY SPECIFIC INFORMATION (INITIAL LOCATIONS)

Unit	Location	Orientation in degrees	Line of Sight in Degrees
1/Indians	45:34:39N/107:24:51W	118	360
1/B&A/Indians	45:34:39N/107:24:51W	121	360
2/Indians	45:34:40N/107:24:50W	136	360
2/B&A/Indians	45:34:40N/107:24:50W	138	360
3/Indians	45:34:38N/107:24:51W	101	360
3/B&A/Indians	45:34:38N/107:24:51W	108	360
4/Indians	45:33:21N/107:24:01W	42	360
4/B&A/Indians	45:33:19N/107:24:02W	39	360
5/Indians	45:34:39N/107:24:48W	138	360
5/B&A/Indians	45:34:39N/107:24:48W	144	360
6/Indians	45:33:30N/107:24:02W	349	360
6/B&A/Indians	45:33:29N/107:24:02W	353	360
7/Indians	45:33:32N/107:24:09W	44	360
7/B&A/Indians	45:33:31N/107:24:09W	35	360
8/Indians	45:33:27N/107:24:01W	43	360
8/B&A/Indians	45:33:25N/107:24:01W	30	360
9/Indians	45:33:35N/107:24:10W	44	360
9/B&A/Indians	45:33:34N/107:24:11W	42	360
10/Indians	45:34:39N/107:24:47W	163	360
10/B&A/Indians	45:34:40N/107:24:47W	168	360
11/Indians	45:34:38N/107:24:49W	102	360
11/B&A/Indians	45:34:38N/107:24:49W	110	360
12/Indians	45:34:40N/107:24:48W	160	360
12/B&A/Indians	45:34:40N/107:24:48W	161	360

Table 21. Ambrose Indians Initial Locations

Unit	Location	Orientation in degrees	Line of Sight in Degrees
HQ/7th Cavalry	45:33:39N/107:23:40W	355	360
1/C/7th Cavalry	45:33:38N/107:23:38W	338	360
2/C/7th Cavalry	45:33:39N/107:23:41W	348	360
3/C/7th Cavalry	45:33:38N/107:23:37W	308	360
1/E/7th Cavalry	45:33:36N/107:23:33W	327	360
2/E/7th Cavalry	45:33:36N/107:23:34W	329	360
3/E/7th Cavalry	45:33:37N/107:23:36W	311	360
1/F/7th Cavalry	45:33:33N/107:23:29W	322	360
2/F/7th Cavalry	45:33:35N/107:23:31W	324	360
3/F/7th Cavalry	45:33:34N/107:23:30W	323	360
1/I/7th Cavalry	45:33:30N/107:23:23W	320	360
2/I/7th Cavalry	45:33:29N/107:23:22W	320	360
3/I/7th Cavalry	45:33:28N/107:23:19W	319	360
1/L/7th Cavalry	45:33:32N/107:23:26W	320	360
2/L/7th Cavalry	45:33:31N/107:23:25W	319	360
3/L/7th Cavalry	45:33:32N/107:23:27W	321	360

Table 22. Ambrose Cavalry Initial Locations

Unit	Location	Orientation in Degrees	Line of Sight in Degrees
1/Indians	45:34:27N/107:24:27W	219	360
1/B&A/Indians	45:34:26N/107:24:27W	216	360
2/Indians	45:33:18N/107:25:25W	74	360
2/B&A/Indians	45:34:40N/107:24:50W	70	360
3/Indians	45:34:30N/107:25:28W	131	360
3/B&A/Indians	45:33:27N/107:23:56W	155	360
4/Indians	45:33:25N/107:23:57W	54	360
4/B&A/Indians	45:33:19N/107:24:02W	46	360
5/Indians	45:33:57N/107:22:51W	256	360
5/B&A/Indians	45:33:58N/107:22:50W	255	360
6/Indians	45:33:31N/107:24:03W	353	360
6/B&A/Indians	45:33:29N/107:24:04W	8	360
7/Indians	45:34:41N/107:24:51W	109	360
7/B&A/Indians	45:34:35N/107:25:33W	133	360
8/Indians	45:34:41N/107:24:51W	140	360
8/B&A/Indians	45:34:32N/107:25:31W	114	360
9/Indians	45:34:13N/107:23:07W	255	360
9/B&A/Indians	45:33:49N/107:22:42W	255	360
10/Indians	45:34:39N/107:24:47W	274	360
10/B&A/Indians	45:33:49N/107:22:40W	274	360
11/Indians	45:34:39N/107:24:50W	168	360
11/B&A/Indians	45:34:29N/107:25:26W	132	360
12/Indians	45:33:19N/107:25:24W	79	360
12/B&A/Indians	45:33:17N/107:25:25W	67	360

Table 23. Fox Indians Initial Locations

Unit	Location	Orientation in Degrees	Line of Sight in Degrees
HQ/7th Cavalry	45:34:05N/107:26:26W	87	360
1/C/7th Cavalry	45:33:38N/107:23:39W	339	360
2/C/7th Cavalry	45:33:39N/107:23:41W	348	360
3/C/7th Cavalry	45:33:38N/107:23:37W	303	360
1/E/7th Cavalry	45:34:04N/107:26:28W	85	360
2/E/7th Cavalry	45:34:03N/107:26:29W	84	360
3/E/7th Cavalry	45:34:03N/107:26:31W	82	360
1/F/7th Cavalry	45:34:02N/107:26:32W	81	360
2/F/7th Cavalry	45:34:01N/107:26:35W	78	360
3/F/7th Cavalry	45:34:02N/107:26:33W	79	360
1/I/7th Cavalry	45:33:34N/107:23:30W	324	360
2/I/7th Cavalry	45:33:33N/107:23:28W	323	360
3/I/7th Cavalry	45:33:32N/107:23:27W	322	360
1/L/7th Cavalry	45:33:37N/107:23:35W	327	360
2/L/7th Cavalry	45:33:35N/107:23:32W	324	360
3/L/7th Cavalry	45:33:36N/107:23:33W	325	360

Table 24. Fox Cavalry Initial Locations

Unit	Location	Orientation in Degrees	Line of Sight in Degrees
1/Indians	45:34:39N/107:24:46W	188	360
1/B&A/Indians	45:34:40N/107:24:47W	66	360
2/Indians	45:33:39N/107:25:58W	45	360
2/B&A/Indians	45:34:40N/107:24:50W	167	360
3/Indians	45:34:38N/107:24:49W	118	360
3/B&A/Indians	45:34:38N/107:24:47W	158	360
4/Indians	45:33:25N/107:23:57W	48	360
4/B&A/Indians	45:33:23N/107:25:25W	45	360
5/Indians	45:34:39N/107:24:48W	42	360
5/B&A/Indians	45:33:22N/107:24:26W	42	360
6/Indians	45:33:29N/107:24:05W	14	360
6/B&A/Indians	45:33:27N/107:24:06W	15	360
7/Indians	45:33:37N/107:24:45W	36	360
7/B&A/Indians	45:33:36N/107:24:46W	32	360
8/Indians	45:33:37N/107:24:44W	31	360
8/B&A/Indians	45:33:37N/107:24:46W	36	360
9/Indians	45:33:38N/107:24:06W	326	360
9/B&A/Indians	45:33:36N/107:24:09W	349	360
10/Indians	45:33:26N/107:25:17W	41	360
10/B&A/Indians	45:33:24N/107:25:19W	40	360
11/Indians	45:34:39N/107:24:48W	143	360
11/B&A/Indians	45:34:40N/107:24:50W	134	360
12/Indians	45:33:40N/107:26:00W	87	360
12/B&A/Indians	45:33:40N/107:26:01W	76	360

Table 25. Gray Indian Initial Locations

Unit	Location	Orientation in Degrees	Line of Sight in Degrees
HQ/7th Cavalry	45:33:39N/107:23:40W	355	360
1/C/7th Cavalry	45:33:38N/107:23:38W	338	360
2/C/7th Cavalry	45:33:39N/107:23:41W	348	360
3/C/7th Cavalry	45:33:38N/107:23:37W	308	360
1/E/7th Cavalry	45:33:36N/107:23:33W	327	360
2/E/7th Cavalry	45:33:36N/107:23:34W	329	360
3/E/7th Cavalry	45:33:37N/107:23:36W	311	360
1/F/7th Cavalry	45:33:33N/107:23:29W	322	360
2/F/7th Cavalry	45:33:35N/107:23:31W	324	360
3/F/7th Cavalry	45:33:34N/107:23:30W	323	360
1/I/7th Cavalry	45:33:30N/107:23:23W	320	360
2/I/7th Cavalry	45:33:29N/107:23:22W	320	360
3/I/7th Cavalry	45:33:28N/107:23:19W	319	360
1/L/7th Cavalry	45:33:32N/107:23:26W	320	360
2/L/7th Cavalry	45:33:31N/107:23:25W	319	360
3/L/7th Cavalry	45:33:32N/107:23:27W	321	360

Table 26. Gray Cavalry Initial Locations

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APPENDIX C. JCATS OUTPUT

A. DIRECT FIRE LOSSES

The weapons of the entities listed in the JCATS output charts below are abbreviated as follows:

Bow	=	Bow & Arrow	Hen	=	Henry Repeating Rifle
Smo	=	Smoothbore Muzzleloader	Win	=	Winchester Repeating Rifle
Rif	=	Rifled Muzzleloader	Spr	=	Springfield 1873 Rifle
Sha	=	Sharp's Rifle			

1. Ambrose

Ambrose 3-1 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	553
1	Indian w/Sha	Cav w/Spring	10
1	Indian w/Smo	Cav w/Spring	28
1	Indian w/Win	Cav w/Spring	36
1	Indian w/Rif	Cav w/Spring	32
1	Indian w/Hen	Cav w/Spring	26
1	Indian w/Spr	Cav w/Spring	6
2	Cav w/Spring	Indian w/Smo	13
2	Cav w/Spring	Indian w/Hen	51
2	Cav w/Spring	Indian w/Rif	24
2	Cav w/Spring	Indian w/Win	72
2	Cav w/Spring	Indian w/Spr	14
2	Cav w/Spring	Indian w/Bow	15
2	Cav w/Spring	Indian w/Sha	16

Ambrose 3-2 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	551
1	Indian w/Win	Cav w/Spring	38
1	Indian w/Smo	Cav w/Spring	39
1	Indian w/Rif	Cav w/Spring	36
1	Indian w/Sha	Cav w/Spring	18
1	Indian w/Spr	Cav w/Spring	10
1	Indian w/Hen	Cav w/Spring	32
2	Cav w/Spring	Indian w/Win	59
2	Cav w/Spring	Indian w/Smo	16
2	Cav w/Spring	Indian w/Rif	22
2	Cav w/Spring	Indian w/Hen	51
2	Cav w/Spring	Indian w/Sha	23
2	Cav w/Spring	Indian w/Bow	18
2	Cav w/Spring	Indian w/Spr	16

Ambrose 3-3 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Hen	Cav w/Spring	54
1	Indian w/Rif	Cav w/Spring	58
1	Indian w/Bow	Cav w/Spring	553
1	Indian w/Win	Cav w/Spring	63
1	Indian w/Smo	Cav w/Spring	53
1	Indian w/Spr	Cav w/Spring	17
1	Indian w/Sha	Cav w/Spring	16
2	Cav w/Spring	Indian w/Smo	19
2	Cav w/Spring	Indian w/Sha	21
2	Cav w/Spring	Indian w/Win	83
2	Cav w/Spring	Indian w/Spr	9
2	Cav w/Spring	Indian w/Bow	20
2	Cav w/Spring	Indian w/Hen	37
2	Cav w/Spring	Indian w/Rif	16

Ambrose 3-4 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	562
1	Indian w/Smo	Cav w/Spring	28
1	Indian w/Hen	Cav w/Spring	27
1	Indian w/Win	Cav w/Spring	42
1	Indian w/Spr	Cav w/Spring	8
1	Indian w/Rif	Cav w/Spring	25
1	Indian w/Sha	Cav w/Spring	11
2	Cav w/Spring	Indian w/Sha	20
2	Cav w/Spring	Indian w/Rif	27
2	Cav w/Spring	Indian w/Smo	26
2	Cav w/Spring	Indian w/Win	57
2	Cav w/Spring	Indian w/Hen	42
2	Cav w/Spring	Indian w/Bow	22
2	Cav w/Spring	Indian w/Spr	11

Ambrose 3-5 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	554
1	Indian w/Hen	Cav w/Spring	44
1	Indian w/Smo	Cav w/Spring	50
1	Indian w/Rif	Cav w/Spring	45
1	Indian w/Sha	Cav w/Spring	19
1	Indian w/Win	Cav w/Spring	54
1	Indian w/Spr	Cav w/Spring	10
2	Cav w/Spring	Indian w/Win	64
2	Cav w/Spring	Indian w/Rif	33
2	Cav w/Spring	Indian w/Hen	38
2	Cav w/Spring	Indian w/Sha	26
2	Cav w/Spring	Indian w/Bow	21
2	Cav w/Spring	Indian w/Smo	11
2	Cav w/Spring	Indian w/Spr	12

Ambrose 3-6 Direct Fire Losses

Side	Target	Shooter	Total Killed

1	Indian w/Bow	Cav w/Spring	551
1	Indian w/Rif	Cav w/Spring	33
1	Indian w/Win	Cav w/Spring	34
1	Indian w/Smo	Cav w/Spring	31
1	Indian w/Hen	Cav w/Spring	36
1	Indian w/Spr	Cav w/Spring	7
1	Indian w/Sha	Cav w/Spring	9
2	Cav w/Spring	Indian w/Rif	22
2	Cav w/Spring	Indian w/Spr	7
2	Cav w/Spring	Indian w/Hen	58
2	Cav w/Spring	Indian w/Win	54
2	Cav w/Spring	Indian w/Smo	21
2	Cav w/Spring	Indian w/Bow	25
2	Cav w/Spring	Indian w/Sha	18

Ambrose 3-7 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	551
1	Indian w/Win	Cav w/Spring	80
1	Indian w/Spr	Cav w/Spring	17
1	Indian w/Sha	Cav w/Spring	27
1	Indian w/Rif	Cav w/Spring	62
1	Indian w/Hen	Cav w/Spring	71
1	Indian w/Smo	Cav w/Spring	62
2	Cav w/Spring	Indian w/Hen	49
2	Cav w/Spring	Indian w/Win	76
2	Cav w/Spring	Indian w/Rif	13
2	Cav w/Spring	Indian w/Sha	23
2	Cav w/Spring	Indian w/Smo	16
2	Cav w/Spring	Indian w/Bow	20
2	Cav w/Spring	Indian w/Spr	8

Ambrose 3-8 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	556
1	Indian w/Win	Cav w/Spring	58
1	Indian w/Smo	Cav w/Spring	54
1	Indian w/Rif	Cav w/Spring	57
1	Indian w/Spr	Cav w/Spring	14
1	Indian w/Hen	Cav w/Spring	52
1	Indian w/Sha	Cav w/Spring	20
2	Cav w/Spring	Indian w/Win	57
2	Cav w/Spring	Indian w/Hen	50
2	Cav w/Spring	Indian w/Smo	20
2	Cav w/Spring	Indian w/Bow	19
2	Cav w/Spring	Indian w/Rif	18
2	Cav w/Spring	Indian w/Sha	33
2	Cav w/Spring	Indian w/Spr	8

Ambrose 3-9 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	559
1	Indian w/Win	Cav w/Spring	34
1	Indian w/Hen	Cav w/Spring	36
1	Indian w/Smo	Cav w/Spring	28
1	Indian w/Sha	Cav w/Spring	13
1	Indian w/Rif	Cav w/Spring	28
1	Indian w/Spr	Cav w/Spring	7
2	Cav w/Spring	Indian w/Hen	65
2	Cav w/Spring	Indian w/Win	60
2	Cav w/Spring	Indian w/Rif	21
2	Cav w/Spring	Indian w/Bow	18
2	Cav w/Spring	Indian w/Smo	13
2	Cav w/Spring	Indian w/Sha	25
2	Cav w/Spring	Indian w/Spr	3

Ambrose 3-10 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	558
1	Indian w/Win	Cav w/Spring	51
1	Indian w/Hen	Cav w/Spring	34
1	Indian w/Sha	Cav w/Spring	14
1	Indian w/Rif	Cav w/Spring	36
1	Indian w/Smo	Cav w/Spring	35
1	Indian w/Spr	Cav w/Spring	8
2	Cav w/Spring	Indian w/Smo	14
2	Cav w/Spring	Indian w/Win	100
2	Cav w/Spring	Indian w/Hen	49
2	Cav w/Spring	Indian w/Sha	15
2	Cav w/Spring	Indian w/Bow	16
2	Cav w/Spring	Indian w/Rif	5
2	Cav w/Spring	Indian w/Spr	6

2. Fox

Fox 3-1 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Hen	Cav w/Spring	5
1	Indian w/Rif	Cav w/Spring	8
1	Indian w/Win	Cav w/Spring	9
1	Indian w/Smo	Cav w/Spring	7
1	Indian w/Bow	Cav w/Spring	31
1	Indian w/Sha	Cav w/Spring	3
2	Cav w/Spring	Indian w/Smo	13
2	Cav w/Spring	Indian w/Rif	21
2	Cav w/Spring	Indian w/Hen	37
2	Cav w/Spring	Indian w/Win	46
2	Cav w/Spring	Indian w/Bow	67
2	Cav w/Spring	Indian w/Sha	16
2	Cav w/Spring	Indian w/Spr	5

Fox 3-2 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Win	Cav w/Spring	24
1	Indian w/Rif	Cav w/Spring	12
1	Indian w/Bow	Cav w/Spring	81
1	Indian w/Hen	Cav w/Spring	19
1	Indian w/Sha	Cav w/Spring	10
1	Indian w/Smo	Cav w/Spring	16
1	Indian w/Spr	Cav w/Spring	6
2	Cav w/Spring	Indian w/Win	52
2	Cav w/Spring	Indian w/Hen	50
2	Cav w/Spring	Indian w/Bow	50
2	Cav w/Spring	Indian w/Rif	10
2	Cav w/Spring	Indian w/Sha	17
2	Cav w/Spring	Indian w/Spr	9
2	Cav w/Spring	Indian w/Smo	17

Fox 3-3 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Win	Cav w/Spring	8
1	Indian w/Rif	Cav w/Spring	4
1	Indian w/Hen	Cav w/Spring	3
1	Indian w/Bow	Cav w/Spring	17
1	Indian w/Sha	Cav w/Spring	1
1	Indian w/Smo	Cav w/Spring	4
2	Cav w/Spring	Indian w/Rif	11
2	Cav w/Spring	Indian w/Win	42
2	Cav w/Spring	Indian w/Hen	34
2	Cav w/Spring	Indian w/Smo	16
2	Cav w/Spring	Indian w/Bow	86
2	Cav w/Spring	Indian w/Sha	8
2	Cav w/Spring	Indian w/Spr	8

Fox 3-4 Direct Fire Losses

Side	Target	Shooter	Total Killed

1	Indian w/Win	Cav w/Spring	23
1	Indian w/Sha	Cav w/Spring	7
1	Indian w/Bow	Cav w/Spring	101
1	Indian w/Smo	Cav w/Spring	10
1	Indian w/Spr	Cav w/Spring	8
1	Indian w/Hen	Cav w/Spring	14
1	Indian w/Rif	Cav w/Spring	11
2	Cav w/Spring	Indian w/Win	52
2	Cav w/Spring	Indian w/Hen	49
2	Cav w/Spring	Indian w/Bow	53
2	Cav w/Spring	Indian w/Sha	18
2	Cav w/Spring	Indian w/Rif	12
2	Cav w/Spring	Indian w/Smo	11
2	Cav w/Spring	Indian w/Spr	10

Fox 3-5 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Win	Cav w/Spring	8
1	Indian w/Rif	Cav w/Spring	3
1	Indian w/Smo	Cav w/Spring	2
1	Indian w/Sha	Cav w/Spring	4
1	Indian w/Bow	Cav w/Spring	75
1	Indian w/Hen	Cav w/Spring	4
2	Cav w/Spring	Indian w/Win	52
2	Cav w/Spring	Indian w/Hen	32
2	Cav w/Spring	Indian w/Spr	8
2	Cav w/Spring	Indian w/Rif	19
2	Cav w/Spring	Indian w/Bow	65
2	Cav w/Spring	Indian w/Sha	16
2	Cav w/Spring	Indian w/Smo	13

Fox 3-6 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Hen	Cav w/Spring	2
1	Indian w/Sha	Cav w/Spring	1
1	Indian w/Rif	Cav w/Spring	8
1	Indian w/Smo	Cav w/Spring	6
1	Indian w/Bow	Cav w/Spring	13
1	Indian w/Win	Cav w/Spring	6
2	Cav w/Spring	Indian w/Hen	40
2	Cav w/Spring	Indian w/Win	54
2	Cav w/Spring	Indian w/Sha	16
2	Cav w/Spring	Indian w/Smo	7
2	Cav w/Spring	Indian w/Bow	70
2	Cav w/Spring	Indian w/Spr	6
2	Cav w/Spring	Indian w/Rif	12

Fox 3-7 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Hen	Cav w/Spring	10
1	Indian w/Win	Cav w/Spring	7
1	Indian w/Rif	Cav w/Spring	6
1	Indian w/Bow	Cav w/Spring	19
1	Indian w/Smo	Cav w/Spring	3
1	Indian w/Spr	Cav w/Spring	1
2	Cav w/Spring	Indian w/Sha	16
2	Cav w/Spring	Indian w/Hen	37
2	Cav w/Spring	Indian w/Win	50
2	Cav w/Spring	Indian w/Bow	72
2	Cav w/Spring	Indian w/Smo	15
2	Cav w/Spring	Indian w/Spr	10
2	Cav w/Spring	Indian w/Rif	5

Fox 3-8 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Sha	Cav w/Spring	11
1	Indian w/Win	Cav w/Spring	27
1	Indian w/Bow	Cav w/Spring	68
1	Indian w/Hen	Cav w/Spring	19
1	Indian w/Spr	Cav w/Spring	4
1	Indian w/Rif	Cav w/Spring	10
1	Indian w/Smo	Cav w/Spring	12
2	Cav w/Spring	Indian w/Win	49
2	Cav w/Spring	Indian w/Smo	16
2	Cav w/Spring	Indian w/Sha	9
2	Cav w/Spring	Indian w/Hen	34
2	Cav w/Spring	Indian w/Bow	71
2	Cav w/Spring	Indian w/Rif	20
2	Cav w/Spring	Indian w/Spr	6

Fox 3-9 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Win	Cav w/Spring	14
1	Indian w/Rif	Cav w/Spring	8
1	Indian w/Sha	Cav w/Spring	3
1	Indian w/Smo	Cav w/Spring	9
1	Indian w/Spr	Cav w/Spring	3
1	Indian w/Bow	Cav w/Spring	33
1	Indian w/Hen	Cav w/Spring	10
2	Cav w/Spring	Indian w/Win	57
2	Cav w/Spring	Indian w/Hen	38
2	Cav w/Spring	Indian w/Bow	68
2	Cav w/Spring	Indian w/Spr	7
2	Cav w/Spring	Indian w/Rif	15
2	Cav w/Spring	Indian w/Sha	9
2	Cav w/Spring	Indian w/Smo	11

Fox 3-10 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Bow	Cav w/Spring	36
1	Indian w/Win	Cav w/Spring	11
1	Indian w/Rif	Cav w/Spring	13
1	Indian w/Sha	Cav w/Spring	4
1	Indian w/Smo	Cav w/Spring	11
1	Indian w/Hen	Cav w/Spring	13
1	Indian w/Spr	Cav w/Spring	4
2	Cav w/Spring	Indian w/Win	58
2	Cav w/Spring	Indian w/Rif	20
2	Cav w/Spring	Indian w/Sha	12
2	Cav w/Spring	Indian w/Spr	11
2	Cav w/Spring	Indian w/Smo	18
2	Cav w/Spring	Indian w/Hen	28
2	Cav w/Spring	Indian w/Bow	58

3. Gray

Gray 3-1 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Spr	Cav w/Spring	12
1	Indian w/Win	Cav w/Spring	48
1	Indian w/Rif	Cav w/Spring	43
1	Indian w/Smo	Cav w/Spring	48
1	Indian w/Sha	Cav w/Spring	16
1	Indian w/Bow	Cav w/Spring	69
1	Indian w/Hen	Cav w/Spring	49
2	Cav w/Spring	Indian w/Rif	27
2	Cav w/Spring	Indian w/Smo	22
2	Cav w/Spring	Indian w/Win	76
2	Cav w/Spring	Indian w/Sha	31
2	Cav w/Spring	Indian w/Bow	3
2	Cav w/Spring	Indian w/Hen	33
2	Cav w/Spring	Indian w/Spr	13

Gray 3-2 Direct Fire Losses

Side	Target	Shooter	Total Killed

1	Indian w/Hen	Cav w/Spring	22
1	Indian w/Spr	Cav w/Spring	4
1	Indian w/Win	Cav w/Spring	19
1	Indian w/Smo	Cav w/Spring	9
1	Indian w/Rif	Cav w/Spring	13
1	Indian w/Bow	Cav w/Spring	8
2	Cav w/Spring	Indian w/Spr	17
2	Cav w/Spring	Indian w/Smo	25
2	Cav w/Spring	Indian w/Win	82
2	Cav w/Spring	Indian w/Hen	27
2	Cav w/Spring	Indian w/Bow	3
2	Cav w/Spring	Indian w/Sha	27
2	Cav w/Spring	Indian w/Rif	24

Gray 3-3 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Hen	Cav w/Spring	17
1	Indian w/Smo	Cav w/Spring	27
1	Indian w/Win	Cav w/Spring	41
1	Indian w/Sha	Cav w/Spring	13
1	Indian w/Rif	Cav w/Spring	32
1	Indian w/Bow	Cav w/Spring	7
1	Indian w/Spr	Cav w/Spring	10
2	Cav w/Spring	Indian w/Rif	22
2	Cav w/Spring	Indian w/Smo	17
2	Cav w/Spring	Indian w/Win	84
2	Cav w/Spring	Indian w/Sha	24
2	Cav w/Spring	Indian w/Bow	5
2	Cav w/Spring	Indian w/Hen	38
2	Cav w/Spring	Indian w/Spr	15

Gray 3-4 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Rif	Cav w/Spring	15
1	Indian w/Sha	Cav w/Spring	6
1	Indian w/Win	Cav w/Spring	29
1	Indian w/Spr	Cav w/Spring	4
1	Indian w/Smo	Cav w/Spring	13
1	Indian w/Hen	Cav w/Spring	13
1	Indian w/Bow	Cav w/Spring	15
2	Cav w/Spring	Indian w/Win	83
2	Cav w/Spring	Indian w/Hen	37
2	Cav w/Spring	Indian w/Rif	25
2	Cav w/Spring	Indian w/Bow	4
2	Cav w/Spring	Indian w/Smo	28
2	Cav w/Spring	Indian w/Sha	18
2	Cav w/Spring	Indian w/Spr	10

Gray 3-5 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Spr	Cav w/Spring	7
1	Indian w/Hen	Cav w/Spring	24
1	Indian w/Smo	Cav w/Spring	21
1	Indian w/Win	Cav w/Spring	28
1	Indian w/Rif	Cav w/Spring	24
1	Indian w/Bow	Cav w/Spring	87
1	Indian w/Sha	Cav w/Spring	8
2	Cav w/Spring	Indian w/Win	73
2	Cav w/Spring	Indian w/Smo	26
2	Cav w/Spring	Indian w/Sha	25
2	Cav w/Spring	Indian w/Bow	3
2	Cav w/Spring	Indian w/Rif	30
2	Cav w/Spring	Indian w/Hen	34
2	Cav w/Spring	Indian w/Spr	14

Gray 3-6 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Smo	Cav w/Spring	15
1	Indian w/Win	Cav w/Spring	20
1	Indian w/Bow	Cav w/Spring	33
1	Indian w/Sha	Cav w/Spring	4
1	Indian w/Hen	Cav w/Spring	9
1	Indian w/Spr	Cav w/Spring	5
1	Indian w/Rif	Cav w/Spring	23
2	Cav w/Spring	Indian w/Win	93
2	Cav w/Spring	Indian w/Sha	28
2	Cav w/Spring	Indian w/Smo	22
2	Cav w/Spring	Indian w/Rif	30
2	Cav w/Spring	Indian w/Spr	5
2	Cav w/Spring	Indian w/Hen	26
2	Cav w/Spring	Indian w/Bow	1

Gray 3-7 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Smo	Cav w/Spring	11
1	Indian w/Win	Cav w/Spring	12
1	Indian w/Rif	Cav w/Spring	12
1	Indian w/Bow	Cav w/Spring	35
1	Indian w/Hen	Cav w/Spring	8
1	Indian w/Sha	Cav w/Spring	3
1	Indian w/Spr	Cav w/Spring	4
2	Cav w/Spring	Indian w/Win	89
2	Cav w/Spring	Indian w/Rif	27
2	Cav w/Spring	Indian w/Sha	23
2	Cav w/Spring	Indian w/Bow	2
2	Cav w/Spring	Indian w/Smo	18
2	Cav w/Spring	Indian w/Hen	33
2	Cav w/Spring	Indian w/Spr	13

Gray 3-8 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Win	Cav w/Spring	21
1	Indian w/Rif	Cav w/Spring	18
1	Indian w/Sha	Cav w/Spring	6
1	Indian w/Spr	Cav w/Spring	1
1	Indian w/Hen	Cav w/Spring	17
1	Indian w/Smo	Cav w/Spring	16
1	Indian w/Bow	Cav w/Spring	66
2	Cav w/Spring	Indian w/Smo	26
2	Cav w/Spring	Indian w/Win	94
2	Cav w/Spring	Indian w/Rif	24
2	Cav w/Spring	Indian w/Sha	24
2	Cav w/Spring	Indian w/Hen	27
2	Cav w/Spring	Indian w/Spr	7
2	Cav w/Spring	Indian w/Bow	3

Gray 3-9 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Hen	Cav w/Spring	25
1	Indian w/Sha	Cav w/Spring	5
1	Indian w/Smo	Cav w/Spring	22
1	Indian w/Win	Cav w/Spring	26
1	Indian w/Rif	Cav w/Spring	25
1	Indian w/Bow	Cav w/Spring	65
1	Indian w/Spr	Cav w/Spring	5
2	Cav w/Spring	Indian w/Win	91
2	Cav w/Spring	Indian w/Rif	18
2	Cav w/Spring	Indian w/Smo	17
2	Cav w/Spring	Indian w/Bow	6
2	Cav w/Spring	Indian w/Sha	32
2	Cav w/Spring	Indian w/Hen	34
2	Cav w/Spring	Indian w/Spr	7

Gray 3-10 Direct Fire Losses

Side	Target	Shooter	Total Killed
1	Indian w/Smo	Cav w/Spring	31
1	Indian w/Hen	Cav w/Spring	31
1	Indian w/Rif	Cav w/Spring	35

1	Indian w/Win	Cav w/Spring	48	2	Cav w/Spring	Indian w/Win	74
1	Indian w/Sha	Cav w/Spring	13	2	Cav w/Spring	Indian w/Hen	38
1	Indian w/Bow	Cav w/Spring	77	2	Cav w/Spring	Indian w/Rif	22
1	Indian w/Spr	Cav w/Spring	10	2	Cav w/Spring	Indian w/Sha	28
2	Cav w/Spring	Indian w/Spr	17	2	Cav w/Spring	Indian w/Bow	2
2	Cav w/Spring	Indian w/Smo	24				

B. DIRECT FIRE SHOTS

The weapons of the entities listed in the JCATS output charts below are abbreviated as follows:

Bow	=	Bow & Arrow	Sha	=	Sharp's Rifle
Smo	=	Smoothbore Muzzleloader	Hen	=	Henry Repeating Rifle
Rif	=	Rifled Muzzleloader	Win	=	Winchester Repeating Rifle
			Spr	=	Springfield 1873 Rifle

The ranges are expressed kilometers. Example: 0.187 = 187 meters

1. Aambrose

Ambrose 3-1 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Sha	2	Cav w/Spring	Springfield	291	0.078	0.187	0.147
1	Indian w/Rif	2	Cav w/Spring	Springfield	284	0.074	0.186	0.146
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1135	0.077	0.197	0.152
1	Indian w/Smo	2	Cav w/Spring	Springfield	240	0.074	0.187	0.148
1	Indian w/Win	2	Cav w/Spring	Winchester .	1990	0.069	0.187	0.151
1	Indian w/Spr	2	Cav w/Spring	Springfield	140	0.081	0.185	0.148
1	Indian w/Bow	2	Cav w/Spring	45CAL	504	0.021	0.069	0.043
2	Cav w/Spring	1	Indian w/Bow	Springfield	2360	0.035	0.364	0.108
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	132	0.037	0.057	0.045
2	Cav w/Spring	1	Indian w/Win	Springfield	97	0.076	0.395	0.206
2	Cav w/Spring	1	Indian w/Smo	Springfield	103	0.056	0.368	0.217
2	Cav w/Spring	1	Indian w/Rif	Springfield	88	0.047	0.371	0.187
2	Cav w/Spring	1	Indian w/Hen	Springfield	94	0.090	0.379	0.242
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	1	0.021	0.021	0.021
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	1	0.007	0.007	0.007
2	Cav w/Spring	1	Indian w/Win	Colt 1873	1	0.044	0.044	0.044
2	Cav w/Spring	1	Indian w/Spr	Springfield	22	0.057	0.381	0.212
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	2	0.034	0.038	0.036
2	Cav w/Spring	1	Indian w/Sha	Springfield	29	0.080	0.363	0.217

Ambrose 3-2 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1382	0.065	0.189	0.148
1	Indian w/Win	2	Cav w/Spring	Winchester .	2033	0.070	0.185	0.146
1	Indian w/Sha	2	Cav w/Spring	Springfield	292	0.079	0.185	0.141
1	Indian w/Smo	2	Cav w/Spring	Springfield	275	0.085	0.186	0.146
1	Indian w/Rif	2	Cav w/Spring	Springfield	305	0.077	0.185	0.143
1	Indian w/Spr	2	Cav w/Spring	Springfield	152	0.073	0.186	0.143
1	Indian w/Bow	2	Cav w/Spring	45CAL	458	0.023	0.056	0.042
2	Cav w/Spring	1	Indian w/Bow	Springfield	2102	0.037	0.367	0.110
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	145	0.029	0.051	0.043
2	Cav w/Spring	1	Indian w/Hen	Springfield	110	0.041	0.386	0.229
2	Cav w/Spring	1	Indian w/Rif	Springfield	103	0.040	0.369	0.184

2	Cav w/Spring	1	Indian w/Win	Springfield	124	0.039	0.347	0.188
2	Cav w/Spring	1	Indian w/Smo	Springfield	100	0.039	0.363	0.192
2	Cav w/Spring	1	Indian w/Sha	Springfield	38	0.047	0.351	0.178
2	Cav w/Spring	1	Indian w/Spr	Springfield	29	0.042	0.366	0.228
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	1	0.036	0.036	0.036
2	Cav w/Spring	1	Indian w/Win	Colt 1873	4	0.021	0.038	0.034
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	1	0.042	0.042	0.042
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	3	0.045	0.047	0.046
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	3	0.042	0.042	0.042

Ambrose 3-3 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	1614	0.062	0.185	0.150
1	Indian w/Rif	2	Cav w/Spring	Springfield	253	0.067	0.186	0.144
1	Indian w/Sha	2	Cav w/Spring	Springfield	256	0.079	0.195	0.145
1	Indian w/Smo	2	Cav w/Spring	Springfield	227	0.076	0.185	0.145
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	858	0.070	0.193	0.149
1	Indian w/Spr	2	Cav w/Spring	Springfield	120	0.079	0.186	0.149
1	Indian w/Bow	2	Cav w/Spring	45CAL	435	0.000	0.062	0.041
2	Cav w/Spring	1	Indian w/Bow	Springfield	2126	0.034	0.327	0.107
2	Cav w/Spring	1	Indian w/Hen	Springfield	146	0.034	0.348	0.172
2	Cav w/Spring	1	Indian w/Smo	Springfield	116	0.040	0.333	0.154
2	Cav w/Spring	1	Indian w/Win	Springfield	130	0.037	0.317	0.150
2	Cav w/Spring	1	Indian w/Rif	Springfield	119	0.037	0.329	0.156
2	Cav w/Spring	1	Indian w/Sha	Springfield	40	0.039	0.316	0.161
2	Cav w/Spring	1	Indian w/Spr	Springfield	28	0.040	0.315	0.139
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	128	0.020	0.053	0.044
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	8	0.024	0.043	0.038
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	7	0.036	0.047	0.045
2	Cav w/Spring	1	Indian w/Win	Colt 1873	5	0.034	0.038	0.037
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	6	0.034	0.041	0.037
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	1	0.043	0.043	0.043

Ambrose 3-4 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Smo	2	Cav w/Spring	Springfield	305	0.077	0.191	0.146
1	Indian w/Spr	2	Cav w/Spring	Springfield	170	0.078	0.185	0.143
1	Indian w/Rif	2	Cav w/Spring	Springfield	348	0.070	0.185	0.145
1	Indian w/Sha	2	Cav w/Spring	Springfield	349	0.077	0.185	0.140
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1549	0.078	0.193	0.154
1	Indian w/Win	2	Cav w/Spring	Winchester .	2072	0.080	0.186	0.155
1	Indian w/Bow	2	Cav w/Spring	45CAL	429	0.029	0.060	0.044
2	Cav w/Spring	1	Indian w/Bow	Springfield	2249	0.018	0.253	0.104
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	127	0.011	0.057	0.043
2	Cav w/Spring	1	Indian w/Win	Springfield	108	0.016	0.220	0.105
2	Cav w/Spring	1	Indian w/Hen	Springfield	86	0.017	0.259	0.110
2	Cav w/Spring	1	Indian w/Spr	Springfield	25	0.037	0.199	0.109
2	Cav w/Spring	1	Indian w/Sha	Springfield	28	0.037	0.228	0.098
2	Cav w/Spring	1	Indian w/Rif	Springfield	82	0.020	0.238	0.100
2	Cav w/Spring	1	Indian w/Smo	Springfield	81	0.020	0.247	0.115
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	6	0.022	0.046	0.035
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	1	0.040	0.040	0.040
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	3	0.036	0.036	0.036

Ambrose 3-5 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	2027	0.066	0.185	0.154
1	Indian w/Smo	2	Cav w/Spring	Springfield	294	0.080	0.214	0.148
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1487	0.075	0.220	0.157
1	Indian w/Sha	2	Cav w/Spring	Springfield	360	0.080	0.186	0.143
1	Indian w/Rif	2	Cav w/Spring	Springfield	330	0.071	0.185	0.145
1	Indian w/Spr	2	Cav w/Spring	Springfield	179	0.079	0.215	0.145
1	Indian w/Bow	2	Cav w/Spring	45CAL	1128	0.018	0.053	0.039
2	Cav w/Spring	1	Indian w/Bow	Springfield	2308	0.032	0.362	0.111
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	143	0.037	0.058	0.045
2	Cav w/Spring	1	Indian w/Hen	Springfield	154	0.042	0.416	0.211
2	Cav w/Spring	1	Indian w/Win	Springfield	136	0.043	0.398	0.162

2	Cav w/Spring	1	Indian w/Rif	Springfield	113	0.041	0.374	0.169
2	Cav w/Spring	1	Indian w/Smo	Springfield	125	0.041	0.391	0.191
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	8	0.028	0.050	0.043
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	5	0.012	0.050	0.036
2	Cav w/Spring	1	Indian w/Sha	Springfield	40	0.042	0.398	0.179
2	Cav w/Spring	1	Indian w/Spr	Springfield	22	0.043	0.352	0.197
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	2	0.043	0.043	0.043
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	4	0.043	0.046	0.045

Ambrose 3-6 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	2046	0.069	0.186	0.148
1	Indian w/Smo	2	Cav w/Spring	Springfield	264	0.078	0.185	0.147
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1232	0.073	0.197	0.153
1	Indian w/Rif	2	Cav w/Spring	Springfield	302	0.076	0.185	0.144
1	Indian w/Sha	2	Cav w/Spring	Springfield	325	0.079	0.184	0.140
1	Indian w/Spr	2	Cav w/Spring	Springfield	153	0.088	0.185	0.144
1	Indian w/Bow	2	Cav w/Spring	45CAL	967	0.017	0.061	0.039
2	Cav w/Spring	1	Indian w/Bow	Springfield	2084	0.033	0.377	0.111
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	128	0.034	0.057	0.044
2	Cav w/Spring	1	Indian w/Win	Springfield	108	0.035	0.397	0.210
2	Cav w/Spring	1	Indian w/Smo	Springfield	86	0.069	0.387	0.246
2	Cav w/Spring	1	Indian w/Rif	Springfield	86	0.016	0.384	0.218
2	Cav w/Spring	1	Indian w/Hen	Springfield	102	0.038	0.402	0.252
2	Cav w/Spring	1	Indian w/Sha	Springfield	26	0.085	0.368	0.245
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	1	0.020	0.020	0.020
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	1	0.038	0.038	0.038
2	Cav w/Spring	1	Indian w/Spr	Springfield	20	0.063	0.390	0.250

Ambrose 3-7 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1113	0.065	0.222	0.155
1	Indian w/Smo	2	Cav w/Spring	Springfield	218	0.069	0.213	0.151
1	Indian w/Win	2	Cav w/Spring	Winchester .	1629	0.058	0.195	0.151
1	Indian w/Rif	2	Cav w/Spring	Springfield	255	0.069	0.201	0.146
1	Indian w/Spr	2	Cav w/Spring	Springfield	120	0.076	0.206	0.147
1	Indian w/Sha	2	Cav w/Spring	Springfield	235	0.078	0.195	0.144
1	Indian w/Bow	2	Cav w/Spring	45CAL	633	0.012	0.052	0.040
2	Cav w/Spring	1	Indian w/Bow	Springfield	2103	0.031	0.366	0.112
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	142	0.033	0.051	0.045
2	Cav w/Spring	1	Indian w/Rif	Springfield	154	0.043	0.357	0.214
2	Cav w/Spring	1	Indian w/Win	Springfield	178	0.034	0.348	0.207
2	Cav w/Spring	1	Indian w/Spr	Springfield	41	0.038	0.365	0.207
2	Cav w/Spring	1	Indian w/Hen	Springfield	162	0.011	0.371	0.227
2	Cav w/Spring	1	Indian w/Win	Colt 1873	6	0.025	0.044	0.038
2	Cav w/Spring	1	Indian w/Sha	Springfield	56	0.040	0.352	0.216
2	Cav w/Spring	1	Indian w/Smo	Springfield	139	0.042	0.369	0.227
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	4	0.036	0.042	0.040
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	5	0.043	0.049	0.045
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	10	0.041	0.049	0.046
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	1	0.046	0.046	0.046

Ambrose 3-8 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Rif	2	Cav w/Spring	Springfield	305	0.073	0.186	0.146
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1245	0.068	0.196	0.157
1	Indian w/Win	2	Cav w/Spring	Winchester .	1652	0.071	0.185	0.157
1	Indian w/Smo	2	Cav w/Spring	Springfield	263	0.083	0.186	0.148
1	Indian w/Spr	2	Cav w/Spring	Springfield	144	0.079	0.185	0.147
1	Indian w/Sha	2	Cav w/Spring	Springfield	331	0.074	0.185	0.142
1	Indian w/Bow	2	Cav w/Spring	45CAL	412	0.029	0.052	0.042
2	Cav w/Spring	1	Indian w/Bow	Springfield	2353	0.036	0.380	0.114
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	116	0.037	0.064	0.046
2	Cav w/Spring	1	Indian w/Hen	Springfield	148	0.041	0.398	0.243
2	Cav w/Spring	1	Indian w/Rif	Springfield	134	0.042	0.389	0.236
2	Cav w/Spring	1	Indian w/Win	Springfield	154	0.035	0.393	0.224
2	Cav w/Spring	1	Indian w/Sha	Springfield	50	0.043	0.394	0.231

2	Cav w/Spring	1	Indian w/Smo	Springfield	142	0.042	0.391	0.262
2	Cav w/Spring	1	Indian w/Spr	Springfield	32	0.061	0.379	0.228
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	6	0.038	0.046	0.042
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	2	0.044	0.044	0.044
2	Cav w/Spring	1	Indian w/Win	Colt 1873	4	0.044	0.044	0.044

Ambrose 3-9 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1258	0.069	0.194	0.150
1	Indian w/Win	2	Cav w/Spring	Winchester .	1946	0.066	0.185	0.150
1	Indian w/Rif	2	Cav w/Spring	Springfield	293	0.068	0.186	0.145
1	Indian w/Smo	2	Cav w/Spring	Springfield	257	0.074	0.185	0.147
1	Indian w/Spr	2	Cav w/Spring	Springfield	145	0.072	0.185	0.145
1	Indian w/Sha	2	Cav w/Spring	Springfield	310	0.071	0.185	0.145
1	Indian w/Bow	2	Cav w/Spring	45CAL	360	0.033	0.061	0.043
2	Cav w/Spring	1	Indian w/Bow	Springfield	2170	0.035	0.347	0.108
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	105	0.035	0.050	0.045
2	Cav w/Spring	1	Indian w/Hen	Springfield	107	0.049	0.383	0.210
2	Cav w/Spring	1	Indian w/Sha	Springfield	34	0.038	0.349	0.174
2	Cav w/Spring	1	Indian w/Rif	Springfield	80	0.039	0.365	0.194
2	Cav w/Spring	1	Indian w/Win	Springfield	90	0.037	0.362	0.171
2	Cav w/Spring	1	Indian w/Smo	Springfield	91	0.046	0.375	0.191
2	Cav w/Spring	1	Indian w/Spr	Springfield	16	0.045	0.332	0.204
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	1	0.028	0.028	0.028
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	2	0.041	0.041	0.041
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	2	0.049	0.049	0.049
2	Cav w/Spring	1	Indian w/Win	Colt 1873	2	0.038	0.039	0.039

Ambrose 3-10 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	753	0.077	0.216	0.148
1	Indian w/Win	2	Cav w/Spring	Winchester .	1328	0.069	0.186	0.142
1	Indian w/Smo	2	Cav w/Spring	Springfield	174	0.083	0.211	0.146
1	Indian w/Sha	2	Cav w/Spring	Springfield	213	0.079	0.188	0.142
1	Indian w/Rif	2	Cav w/Spring	Springfield	213	0.077	0.185	0.141
1	Indian w/Spr	2	Cav w/Spring	Springfield	93	0.083	0.215	0.146
1	Indian w/Bow	2	Cav w/Spring	45CAL	479	0.027	0.059	0.042
2	Cav w/Spring	1	Indian w/Bow	Springfield	2023	0.039	0.381	0.110
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	123	0.035	0.051	0.045
2	Cav w/Spring	1	Indian w/Hen	Springfield	95	0.048	0.415	0.227
2	Cav w/Spring	1	Indian w/Win	Springfield	108	0.039	0.393	0.193
2	Cav w/Spring	1	Indian w/Spr	Springfield	34	0.049	0.404	0.203
2	Cav w/Spring	1	Indian w/Rif	Springfield	96	0.044	0.395	0.212
2	Cav w/Spring	1	Indian w/Sha	Springfield	28	0.038	0.377	0.184
2	Cav w/Spring	1	Indian w/Smo	Springfield	79	0.046	0.407	0.209
2	Cav w/Spring	1	Indian w/Win	Colt 1873	1	0.036	0.036	0.036

2. Fox

Fox 3-1 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Sha	2	Cav w/Spring	Springfield	514	0.054	0.185	0.127
1	Indian w/Smo	2	Cav w/Spring	Springfield	433	0.044	0.188	0.130
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1844	0.065	0.194	0.142
1	Indian w/Win	2	Cav w/Spring	Winchester .	2712	0.080	0.193	0.133
1	Indian w/Spr	2	Cav w/Spring	Springfield	250	0.064	0.194	0.129
1	Indian w/Rif	2	Cav w/Spring	Springfield	528	0.034	0.185	0.128
1	Indian w/Bow	2	Cav w/Spring	45CAL	6481	0.003	0.051	0.038
2	Cav w/Spring	1	Indian w/Hen	Springfield	35	0.033	0.212	0.112
2	Cav w/Spring	1	Indian w/Rif	Springfield	76	0.021	0.144	0.109
2	Cav w/Spring	1	Indian w/Win	Springfield	103	0.038	0.132	0.104
2	Cav w/Spring	1	Indian w/Win	Colt 1873	30	0.025	0.049	0.041
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	4	0.036	0.051	0.045
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	4	0.039	0.042	0.040
2	Cav w/Spring	1	Indian w/Smo	Springfield	39	0.028	0.186	0.100
2	Cav w/Spring	1	Indian w/Bow	Springfield	482	0.012	0.251	0.115

2	Cav w/Spring	1	Indian w/Sha	Springfield	32	0.022	0.128	0.104
2	Cav w/Spring	1	Indian w/Spr	Springfield	10	0.101	0.185	0.135
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	9	0.027	0.049	0.040
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	4	0.012	0.048	0.039
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	22	0.018	0.049	0.036

Fox 3-2 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Spr	2	Cav w/Spring	Springfield	220	0.074	0.191	0.131
1	Indian w/Sha	2	Cav w/Spring	Springfield	442	0.078	0.190	0.128
1	Indian w/Win	2	Cav w/Spring	Winchester .	2323	0.075	0.192	0.136
1	Indian w/Rif	2	Cav w/Spring	Springfield	444	0.065	0.188	0.130
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1494	0.064	0.191	0.139
1	Indian w/Smo	2	Cav w/Spring	Springfield	378	0.074	0.186	0.131
1	Indian w/Bow	2	Cav w/Spring	45CAL	5737	0.004	0.050	0.039
2	Cav w/Spring	1	Indian w/Hen	Springfield	68	0.012	0.274	0.094
2	Cav w/Spring	1	Indian w/Smo	Springfield	92	0.018	0.276	0.092
2	Cav w/Spring	1	Indian w/Win	Springfield	139	0.005	0.215	0.101
2	Cav w/Spring	1	Indian w/Win	Colt 1873	33	0.007	0.048	0.031
2	Cav w/Spring	1	Indian w/Sha	Springfield	45	0.006	0.164	0.092
2	Cav w/Spring	1	Indian w/Rif	Springfield	95	0.022	0.279	0.104
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	20	0.011	0.048	0.024
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	7	0.030	0.043	0.035
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	39	0.002	0.049	0.034
2	Cav w/Spring	1	Indian w/Bow	Springfield	639	0.004	0.281	0.108
2	Cav w/Spring	1	Indian w/Spr	Springfield	22	0.010	0.254	0.081
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	7	0.009	0.044	0.030
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	14	0.006	0.040	0.021
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	3	0.042	0.042	0.042

Fox 3-3 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	2824	0.077	0.185	0.134
1	Indian w/Spr	2	Cav w/Spring	Springfield	249	0.071	0.196	0.135
1	Indian w/Smo	2	Cav w/Spring	Springfield	435	0.065	0.193	0.135
1	Indian w/Rif	2	Cav w/Spring	Springfield	494	0.058	0.185	0.135
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1861	0.060	0.199	0.140
1	Indian w/Sha	2	Cav w/Spring	Springfield	520	0.060	0.185	0.127
1	Indian w/Bow	2	Cav w/Spring	45CAL	5518	0.004	0.051	0.038
2	Cav w/Spring	1	Indian w/Win	Springfield	100	0.024	0.138	0.106
2	Cav w/Spring	1	Indian w/Bow	Springfield	371	0.009	0.197	0.113
2	Cav w/Spring	1	Indian w/Rif	Springfield	54	0.038	0.172	0.111
2	Cav w/Spring	1	Indian w/Sha	Springfield	26	0.089	0.130	0.110
2	Cav w/Spring	1	Indian w/Smo	Springfield	37	0.020	0.183	0.103
2	Cav w/Spring	1	Indian w/Spr	Springfield	8	0.022	0.135	0.095
2	Cav w/Spring	1	Indian w/Hen	Springfield	23	0.020	0.219	0.109
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	5	0.037	0.040	0.039
2	Cav w/Spring	1	Indian w/Win	Colt 1873	13	0.016	0.042	0.035
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	4	0.047	0.050	0.049
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	3	0.002	0.039	0.027

Fox 3-4 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1751	0.059	0.200	0.145
1	Indian w/Smo	2	Cav w/Spring	Springfield	409	0.044	0.199	0.135
1	Indian w/Win	2	Cav w/Spring	Winchester .	2456	0.060	0.190	0.140
1	Indian w/Rif	2	Cav w/Spring	Springfield	490	0.032	0.196	0.132
1	Indian w/Sha	2	Cav w/Spring	Springfield	424	0.060	0.191	0.132
1	Indian w/Spr	2	Cav w/Spring	Springfield	234	0.064	0.197	0.135
1	Indian w/Bow	2	Cav w/Spring	45CAL	5876	0.001	0.051	0.038
2	Cav w/Spring	1	Indian w/Bow	Springfield	568	0.005	0.285	0.121
2	Cav w/Spring	1	Indian w/Win	Springfield	122	0.006	0.284	0.112
2	Cav w/Spring	1	Indian w/Rif	Springfield	90	0.009	0.277	0.113
2	Cav w/Spring	1	Indian w/Sha	Springfield	33	0.013	0.278	0.105
2	Cav w/Spring	1	Indian w/Spr	Springfield	31	0.014	0.262	0.110
2	Cav w/Spring	1	Indian w/Smo	Springfield	69	0.019	0.272	0.106
2	Cav w/Spring	1	Indian w/Hen	Springfield	56	0.019	0.269	0.106

2	Cav w/Spring	1	Indian w/Win	Colt 1873	33	0.010	0.048	0.036
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	4	0.022	0.032	0.026
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	9	0.024	0.040	0.032
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	5	0.017	0.027	0.022
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	7	0.024	0.040	0.030
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	49	0.006	0.051	0.033
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	7	0.018	0.045	0.040

Fox 3-5 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	2764	0.070	0.185	0.137
1	Indian w/Spr	2	Cav w/Spring	Springfield	229	0.054	0.185	0.134
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1694	0.066	0.191	0.144
1	Indian w/Rif	2	Cav w/Spring	Springfield	491	0.059	0.186	0.135
1	Indian w/Sha	2	Cav w/Spring	Springfield	477	0.057	0.185	0.131
1	Indian w/Smo	2	Cav w/Spring	Springfield	404	0.061	0.185	0.139
1	Indian w/Bow	2	Cav w/Spring	45CAL	5652	0.004	0.051	0.038
2	Cav w/Spring	1	Indian w/Rif	Springfield	48	0.082	0.195	0.121
2	Cav w/Spring	1	Indian w/Hen	Springfield	25	0.035	0.210	0.112
2	Cav w/Spring	1	Indian w/Smo	Springfield	30	0.019	0.199	0.116
2	Cav w/Spring	1	Indian w/Win	Springfield	89	0.009	0.206	0.114
2	Cav w/Spring	1	Indian w/Win	Colt 1873	14	0.031	0.049	0.041
2	Cav w/Spring	1	Indian w/Bow	Springfield	463	0.010	0.220	0.114
2	Cav w/Spring	1	Indian w/Sha	Springfield	17	0.016	0.152	0.115
2	Cav w/Spring	1	Indian w/Spr	Springfield	3	0.137	0.198	0.172
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	10	0.022	0.050	0.039

Fox 3-6 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Sha	2	Cav w/Spring	Springfield	518	0.044	0.276	0.136
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1726	0.066	0.198	0.142
1	Indian w/Smo	2	Cav w/Spring	Springfield	391	0.055	0.286	0.139
1	Indian w/Rif	2	Cav w/Spring	Springfield	495	0.047	0.281	0.136
1	Indian w/Spr	2	Cav w/Spring	Springfield	234	0.056	0.185	0.134
1	Indian w/Win	2	Cav w/Spring	Winchester .	3092	0.061	0.185	0.141
1	Indian w/Bow	2	Cav w/Spring	45CAL	6971	0.005	0.051	0.040
2	Cav w/Spring	1	Indian w/Hen	Springfield	30	0.056	0.212	0.120
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	8	0.016	0.048	0.039
2	Cav w/Spring	1	Indian w/Rif	Springfield	45	0.048	0.187	0.109
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	15	0.026	0.049	0.038
2	Cav w/Spring	1	Indian w/Win	Colt 1873	7	0.026	0.046	0.035
2	Cav w/Spring	1	Indian w/Bow	Springfield	199	0.014	0.215	0.107
2	Cav w/Spring	1	Indian w/Win	Springfield	80	0.028	0.179	0.110
2	Cav w/Spring	1	Indian w/Sha	Springfield	22	0.076	0.208	0.115
2	Cav w/Spring	1	Indian w/Spr	Springfield	8	0.063	0.115	0.103
2	Cav w/Spring	1	Indian w/Smo	Springfield	32	0.057	0.194	0.114
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	1	0.040	0.040	0.040
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	3	0.031	0.047	0.040
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	6	0.040	0.050	0.043

Fox 3-7 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Rif	2	Cav w/Spring	Springfield	495	0.066	0.197	0.133
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1772	0.055	0.215	0.143
1	Indian w/Win	2	Cav w/Spring	Winchester .	2973	0.080	0.189	0.136
1	Indian w/Spr	2	Cav w/Spring	Springfield	244	0.066	0.209	0.133
1	Indian w/Smo	2	Cav w/Spring	Springfield	410	0.057	0.206	0.137
1	Indian w/Sha	2	Cav w/Spring	Springfield	519	0.058	0.185	0.128
1	Indian w/Bow	2	Cav w/Spring	45CAL	5967	0.001	0.051	0.038
2	Cav w/Spring	1	Indian w/Rif	Springfield	64	0.018	0.198	0.115
2	Cav w/Spring	1	Indian w/Win	Springfield	76	0.063	0.191	0.113
2	Cav w/Spring	1	Indian w/Hen	Springfield	31	0.036	0.189	0.097
2	Cav w/Spring	1	Indian w/Win	Colt 1873	20	0.023	0.050	0.039
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	3	0.024	0.045	0.038
2	Cav w/Spring	1	Indian w/Smo	Springfield	31	0.015	0.168	0.104
2	Cav w/Spring	1	Indian w/Bow	Springfield	316	0.005	0.274	0.115

2	Cav w/Spring	1	Indian w/Sha	Springfield	32	0.017	0.155	0.100
2	Cav w/Spring	1	Indian w/Spr	Springfield	14	0.091	0.160	0.122
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	4	0.025	0.047	0.036
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	9	0.010	0.033	0.019
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	12	0.006	0.025	0.015

Fox 3-8 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	2734	0.080	0.185	0.137
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1851	0.063	0.203	0.143
1	Indian w/Rif	2	Cav w/Spring	Springfield	531	0.049	0.185	0.130
1	Indian w/Smo	2	Cav w/Spring	Springfield	422	0.063	0.194	0.135
1	Indian w/Sha	2	Cav w/Spring	Springfield	489	0.051	0.185	0.132
1	Indian w/Spr	2	Cav w/Spring	Springfield	239	0.062	0.195	0.134
1	Indian w/Bow	2	Cav w/Spring	45CAL	5771	0.003	0.051	0.038
2	Cav w/Spring	1	Indian w/Hen	Springfield	70	0.011	0.277	0.111
2	Cav w/Spring	1	Indian w/Spr	Springfield	19	0.018	0.246	0.096
2	Cav w/Spring	1	Indian w/Win	Springfield	137	0.006	0.269	0.099
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	14	0.022	0.050	0.038
2	Cav w/Spring	1	Indian w/Rif	Springfield	90	0.008	0.283	0.098
2	Cav w/Spring	1	Indian w/Smo	Springfield	72	0.006	0.285	0.106
2	Cav w/Spring	1	Indian w/Win	Colt 1873	21	0.007	0.048	0.033
2	Cav w/Spring	1	Indian w/Sha	Springfield	45	0.014	0.285	0.104
2	Cav w/Spring	1	Indian w/Bow	Springfield	471	0.006	0.284	0.103
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	16	0.006	0.045	0.034
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	38	0.007	0.049	0.030
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	4	0.018	0.048	0.040
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	9	0.041	0.051	0.046
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	4	0.006	0.022	0.014

Fox 3-9 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Spr	2	Cav w/Spring	Springfield	225	0.068	0.190	0.134
1	Indian w/Win	2	Cav w/Spring	Winchester .	2712	0.063	0.185	0.136
1	Indian w/Sha	2	Cav w/Spring	Springfield	449	0.067	0.185	0.131
1	Indian w/Rif	2	Cav w/Spring	Springfield	491	0.054	0.186	0.129
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1678	0.057	0.195	0.141
1	Indian w/Smo	2	Cav w/Spring	Springfield	396	0.063	0.185	0.132
1	Indian w/Bow	2	Cav w/Spring	45CAL	6427	0.005	0.051	0.038
2	Cav w/Spring	1	Indian w/Bow	Springfield	361	0.009	0.212	0.104
2	Cav w/Spring	1	Indian w/Sha	Springfield	29	0.014	0.128	0.098
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	17	0.035	0.049	0.043
2	Cav w/Spring	1	Indian w/Win	Colt 1873	29	0.001	0.050	0.032
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	2	0.028	0.029	0.028
2	Cav w/Spring	1	Indian w/Rif	Springfield	62	0.009	0.129	0.101
2	Cav w/Spring	1	Indian w/Win	Springfield	110	0.015	0.147	0.103
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	11	0.028	0.047	0.037
2	Cav w/Spring	1	Indian w/Spr	Springfield	14	0.063	0.192	0.109
2	Cav w/Spring	1	Indian w/Smo	Springfield	45	0.011	0.193	0.093
2	Cav w/Spring	1	Indian w/Hen	Springfield	40	0.008	0.209	0.104
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	26	0.012	0.050	0.030
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	3	0.045	0.048	0.046
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	1	0.043	0.043	0.043

Fox 3-10 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Smo	2	Cav w/Spring	Springfield	377	0.057	0.186	0.131
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1528	0.074	0.194	0.139
1	Indian w/Sha	2	Cav w/Spring	Springfield	434	0.057	0.190	0.128
1	Indian w/Rif	2	Cav w/Spring	Springfield	452	0.058	0.197	0.128
1	Indian w/Win	2	Cav w/Spring	Winchester .	2645	0.056	0.194	0.134
1	Indian w/Spr	2	Cav w/Spring	Springfield	207	0.061	0.190	0.128
1	Indian w/Bow	2	Cav w/Spring	45CAL	5771	0.001	0.051	0.039
2	Cav w/Spring	1	Indian w/Bow	Springfield	412	0.009	0.234	0.109
2	Cav w/Spring	1	Indian w/Win	Springfield	93	0.007	0.269	0.115
2	Cav w/Spring	1	Indian w/Sha	Springfield	30	0.024	0.262	0.103
2	Cav w/Spring	1	Indian w/Rif	Springfield	65	0.007	0.261	0.106

2	Cav w/Spring	1	Indian w/Smo	Springfield	51	0.018	0.255	0.105
2	Cav w/Spring	1	Indian w/Hen	Springfield	43	0.012	0.250	0.098
2	Cav w/Spring	1	Indian w/Spr	Springfield	14	0.041	0.198	0.107
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	6	0.016	0.042	0.027
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	3	0.021	0.023	0.022
2	Cav w/Spring	1	Indian w/Win	Colt 1873	3	0.019	0.044	0.036
2	Cav w/Spring	1	Indian w/Spr	Colt 1873	2	0.020	0.023	0.022
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	14	0.027	0.044	0.036
2	Cav w/Spring	1	Indian w/Rif	Colt 1873	13	0.018	0.045	0.030
2	Cav w/Spring	1	Indian w/Sha	Colt 1873	1	0.005	0.005	0.005

3. Gray

Gray 3-1 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Rif	2	Cav w/Spring	Springfield	274	0.063	0.301	0.154
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	943	0.058	0.248	0.125
1	Indian w/Win	2	Cav w/Spring	Winchester .	1063	0.064	0.245	0.119
1	Indian w/Smo	2	Cav w/Spring	Springfield	260	0.059	0.343	0.168
1	Indian w/Sha	2	Cav w/Spring	Springfield	236	0.058	0.284	0.134
1	Indian w/Spr	2	Cav w/Spring	Springfield	129	0.060	0.326	0.161
1	Indian w/Bow	2	Cav w/Spring	45CAL	309	0.022	0.050	0.042
2	Cav w/Spring	1	Indian w/Win	Springfield	186	0.060	0.247	0.144
2	Cav w/Spring	1	Indian w/Spr	Springfield	42	0.061	0.250	0.146
2	Cav w/Spring	1	Indian w/Hen	Springfield	236	0.055	0.265	0.165
2	Cav w/Spring	1	Indian w/Smo	Springfield	173	0.055	0.259	0.158
2	Cav w/Spring	1	Indian w/Rif	Springfield	171	0.062	0.256	0.157
2	Cav w/Spring	1	Indian w/Sha	Springfield	65	0.059	0.249	0.155
2	Cav w/Spring	1	Indian w/Bow	Springfield	235	0.057	0.236	0.124

Gray 3-2 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Smo	2	Cav w/Spring	Springfield	241	0.055	0.278	0.141
1	Indian w/Win	2	Cav w/Spring	Winchester .	1352	0.062	0.248	0.128
1	Indian w/Rif	2	Cav w/Spring	Springfield	276	0.044	0.269	0.142
1	Indian w/Sha	2	Cav w/Spring	Springfield	308	0.052	0.262	0.140
1	Indian w/Spr	2	Cav w/Spring	Springfield	109	0.071	0.289	0.146
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1076	0.041	0.225	0.129
1	Indian w/Bow	2	Cav w/Spring	45CAL	304	0.020	0.050	0.040
2	Cav w/Spring	1	Indian w/Hen	Springfield	99	0.061	0.250	0.163
2	Cav w/Spring	1	Indian w/Win	Springfield	203	0.063	0.264	0.134
2	Cav w/Spring	1	Indian w/Smo	Springfield	97	0.077	0.270	0.158
2	Cav w/Spring	1	Indian w/Sha	Springfield	57	0.070	0.264	0.133
2	Cav w/Spring	1	Indian w/Rif	Springfield	123	0.058	0.268	0.152
2	Cav w/Spring	1	Indian w/Spr	Springfield	28	0.081	0.265	0.155
2	Cav w/Spring	1	Indian w/Bow	Springfield	131	0.078	0.205	0.125

Gray 3-3 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Smo	2	Cav w/Spring	Springfield	243	0.050	0.304	0.162
1	Indian w/Rif	2	Cav w/Spring	Springfield	227	0.045	0.304	0.155
1	Indian w/Win	2	Cav w/Spring	Winchester .	877	0.051	0.249	0.113
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	919	0.057	0.248	0.125
1	Indian w/Sha	2	Cav w/Spring	Springfield	188	0.044	0.274	0.134
1	Indian w/Spr	2	Cav w/Spring	Springfield	107	0.072	0.289	0.148
1	Indian w/Bow	2	Cav w/Spring	45CAL	581	0.031	0.051	0.043
2	Cav w/Spring	1	Indian w/Hen	Springfield	188	0.068	0.258	0.166
2	Cav w/Spring	1	Indian w/Smo	Springfield	158	0.062	0.236	0.159
2	Cav w/Spring	1	Indian w/Win	Springfield	149	0.068	0.222	0.138
2	Cav w/Spring	1	Indian w/Rif	Springfield	170	0.058	0.228	0.159
2	Cav w/Spring	1	Indian w/Sha	Springfield	49	0.073	0.222	0.147
2	Cav w/Spring	1	Indian w/Spr	Springfield	42	0.069	0.220	0.148
2	Cav w/Spring	1	Indian w/Bow	Springfield	99	0.068	0.230	0.130

Gray 3-4 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	1134	0.052	0.249	0.121
1	Indian w/Rif	2	Cav w/Spring	Springfield	283	0.045	0.305	0.159
1	Indian w/Smo	2	Cav w/Spring	Springfield	252	0.025	0.300	0.149
1	Indian w/Spr	2	Cav w/Spring	Springfield	110	0.060	0.312	0.148
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	938	0.056	0.211	0.123
1	Indian w/Sha	2	Cav w/Spring	Springfield	219	0.052	0.278	0.138
1	Indian w/Bow	2	Cav w/Spring	45CAL	633	0.019	0.050	0.042
2	Cav w/Spring	1	Indian w/Rif	Springfield	120	0.062	0.219	0.137
2	Cav w/Spring	1	Indian w/Win	Springfield	165	0.045	0.216	0.127
2	Cav w/Spring	1	Indian w/Sha	Springfield	50	0.039	0.201	0.125
2	Cav w/Spring	1	Indian w/Smo	Springfield	82	0.044	0.218	0.136
2	Cav w/Spring	1	Indian w/Hen	Springfield	100	0.062	0.245	0.152
2	Cav w/Spring	1	Indian w/Spr	Springfield	27	0.079	0.216	0.131
2	Cav w/Spring	1	Indian w/Bow	Springfield	173	0.041	0.239	0.128
2	Cav w/Spring	1	Indian w/Bow	Colt 1873	9	0.040	0.046	0.043

Gray 3-5 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	1069	0.021	0.249	0.122
1	Indian w/Rif	2	Cav w/Spring	Springfield	263	0.061	0.322	0.146
1	Indian w/Sha	2	Cav w/Spring	Springfield	240	0.027	0.277	0.126
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	917	0.051	0.246	0.119
1	Indian w/Smo	2	Cav w/Spring	Springfield	282	0.045	0.308	0.153
1	Indian w/Spr	2	Cav w/Spring	Springfield	121	0.061	0.307	0.147
1	Indian w/Bow	2	Cav w/Spring	45CAL	413	0.021	0.050	0.041
2	Cav w/Spring	1	Indian w/Spr	Springfield	37	0.072	0.214	0.124
2	Cav w/Spring	1	Indian w/Smo	Springfield	141	0.060	0.231	0.120
2	Cav w/Spring	1	Indian w/Hen	Springfield	163	0.065	0.246	0.134
2	Cav w/Spring	1	Indian w/Win	Springfield	165	0.061	0.195	0.110
2	Cav w/Spring	1	Indian w/Rif	Springfield	123	0.040	0.192	0.111
2	Cav w/Spring	1	Indian w/Smo	Colt 1873	2	0.036	0.038	0.037
2	Cav w/Spring	1	Indian w/Sha	Springfield	55	0.068	0.203	0.111
2	Cav w/Spring	1	Indian w/Bow	Springfield	286	0.062	0.236	0.115
2	Cav w/Spring	1	Indian w/Hen	Colt 1873	1	0.037	0.037	0.037

Gray 3-6 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Rif	2	Cav w/Spring	Springfield	267	0.062	0.284	0.139
1	Indian w/Smo	2	Cav w/Spring	Springfield	248	0.055	0.286	0.146
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	985	0.059	0.243	0.128
1	Indian w/Win	2	Cav w/Spring	Winchester .	1074	0.036	0.248	0.119
1	Indian w/Sha	2	Cav w/Spring	Springfield	253	0.045	0.263	0.134
1	Indian w/Spr	2	Cav w/Spring	Springfield	106	0.060	0.281	0.144
1	Indian w/Bow	2	Cav w/Spring	45CAL	225	0.045	0.051	0.047
2	Cav w/Spring	1	Indian w/Smo	Springfield	92	0.071	0.228	0.134
2	Cav w/Spring	1	Indian w/Win	Springfield	137	0.057	0.210	0.125
2	Cav w/Spring	1	Indian w/Sha	Springfield	43	0.082	0.199	0.126
2	Cav w/Spring	1	Indian w/Rif	Springfield	115	0.063	0.200	0.134
2	Cav w/Spring	1	Indian w/Spr	Springfield	37	0.071	0.249	0.145
2	Cav w/Spring	1	Indian w/Bow	Springfield	153	0.079	0.200	0.130
2	Cav w/Spring	1	Indian w/Hen	Springfield	112	0.074	0.253	0.149

Gray 3-7 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Rif	2	Cav w/Spring	Springfield	271	0.021	0.292	0.152
1	Indian w/Smo	2	Cav w/Spring	Springfield	254	0.043	0.290	0.163

1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	942	0.047	0.250	0.125
1	Indian w/Win	2	Cav w/Spring	Winchester .	1074	0.056	0.249	0.119
1	Indian w/Sha	2	Cav w/Spring	Springfield	253	0.014	0.283	0.140
1	Indian w/Spr	2	Cav w/Spring	Springfield	124	0.041	0.293	0.153
1	Indian w/Bow	2	Cav w/Spring	45CAL	254	0.025	0.050	0.042
2	Cav w/Spring	1	Indian w/Smo	Springfield	82	0.061	0.247	0.129
2	Cav w/Spring	1	Indian w/Win	Springfield	146	0.063	0.205	0.116
2	Cav w/Spring	1	Indian w/Sha	Springfield	46	0.038	0.198	0.123
2	Cav w/Spring	1	Indian w/Rif	Springfield	89	0.062	0.221	0.122
2	Cav w/Spring	1	Indian w/Spr	Springfield	22	0.064	0.230	0.136
2	Cav w/Spring	1	Indian w/Hen	Springfield	75	0.056	0.288	0.149
2	Cav w/Spring	1	Indian w/Bow	Springfield	118	0.057	0.240	0.132
2	Cav w/Spring	1	Indian w/Win	Colt 1873	2	0.041	0.048	0.045

Gray 3-8 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Sha	2	Cav w/Spring	Springfield	235	0.050	0.281	0.146
1	Indian w/Rif	2	Cav w/Spring	Springfield	266	0.066	0.301	0.161
1	Indian w/Win	2	Cav w/Spring	Winchester .	946	0.048	0.260	0.116
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	870	0.052	0.249	0.127
1	Indian w/Smo	2	Cav w/Spring	Springfield	269	0.070	0.325	0.167
1	Indian w/Spr	2	Cav w/Spring	Springfield	107	0.048	0.309	0.154
1	Indian w/Bow	2	Cav w/Spring	45CAL	302	0.030	0.050	0.045
2	Cav w/Spring	1	Indian w/Win	Springfield	135	0.067	0.277	0.124
2	Cav w/Spring	1	Indian w/Sha	Springfield	46	0.066	0.282	0.128
2	Cav w/Spring	1	Indian w/Spr	Springfield	26	0.078	0.240	0.135
2	Cav w/Spring	1	Indian w/Rif	Springfield	98	0.082	0.291	0.141
2	Cav w/Spring	1	Indian w/Smo	Springfield	97	0.070	0.297	0.150
2	Cav w/Spring	1	Indian w/Hen	Springfield	120	0.068	0.301	0.156
2	Cav w/Spring	1	Indian w/Bow	Springfield	186	0.070	0.305	0.156

Gray 3-9 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Rif	2	Cav w/Spring	Springfield	275	0.056	0.293	0.162
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	984	0.053	0.248	0.130
1	Indian w/Win	2	Cav w/Spring	Winchester .	1155	0.061	0.248	0.120
1	Indian w/Smo	2	Cav w/Spring	Springfield	285	0.072	0.309	0.178
1	Indian w/Sha	2	Cav w/Spring	Springfield	259	0.061	0.291	0.140
1	Indian w/Spr	2	Cav w/Spring	Springfield	128	0.076	0.314	0.166
1	Indian w/Bow	2	Cav w/Spring	45CAL	923	0.026	0.051	0.043
2	Cav w/Spring	1	Indian w/Smo	Springfield	109	0.082	0.282	0.159
2	Cav w/Spring	1	Indian w/Hen	Springfield	110	0.079	0.286	0.169
2	Cav w/Spring	1	Indian w/Sha	Springfield	36	0.059	0.268	0.134
2	Cav w/Spring	1	Indian w/Rif	Springfield	129	0.058	0.273	0.144
2	Cav w/Spring	1	Indian w/Win	Springfield	191	0.075	0.265	0.134
2	Cav w/Spring	1	Indian w/Spr	Springfield	35	0.084	0.285	0.163
2	Cav w/Spring	1	Indian w/Bow	Springfield	185	0.089	0.296	0.197

Gray 3-10 Direct Fire Shots

Side	Shooter	Side	Target	Ammo	Shots	Min Range	Max Range	Ave Range
1	Indian w/Win	2	Cav w/Spring	Winchester .	970	0.050	0.249	0.117
1	Indian w/Rif	2	Cav w/Spring	Springfield	228	0.062	0.269	0.129
1	Indian w/Smo	2	Cav w/Spring	Springfield	213	0.063	0.266	0.132
1	Indian w/Spr	2	Cav w/Spring	Springfield	116	0.060	0.289	0.135
1	Indian w/Sha	2	Cav w/Spring	Springfield	226	0.058	0.258	0.124
1	Indian w/Hen	2	Cav w/Spring	Henry .44 Ca	1027	0.060	0.240	0.126
1	Indian w/Bow	2	Cav w/Spring	45CAL	590	0.029	0.051	0.044
2	Cav w/Spring	1	Indian w/Hen	Springfield	142	0.055	0.266	0.146
2	Cav w/Spring	1	Indian w/Smo	Springfield	126	0.062	0.258	0.145
2	Cav w/Spring	1	Indian w/Rif	Springfield	137	0.062	0.240	0.148
2	Cav w/Spring	1	Indian w/Spr	Springfield	43	0.059	0.263	0.145
2	Cav w/Spring	1	Indian w/Win	Springfield	193	0.071	0.268	0.135
2	Cav w/Spring	1	Indian w/Sha	Springfield	63	0.066	0.273	0.151
2	Cav w/Spring	1	Indian w/Bow	Springfield	221	0.050	0.238	0.136

C. DIRECT FIRE EFFECTS

The weapons of the entities listed in the JCATS output charts below are abbreviated as follows:

Bow	=	Bow & Arrow	Hen	=	Henry Repeating Rifle
Smo	=	Smoothbore Muzzleloader	Win	=	Winchester Repeating Rifle
Rif	=	Rifled Muzzleloader	Spr	=	Springfield 1873 Rifle
Sha	=	Sharp's Rifle			

The abbreviations for the listed effects on the target are:

HT - Hit

KK - Kill

SUS - Suppressed

MOB - Mobility Kill

MFP - Mobility & Firepower Kill

FP - Firepower Kill

MS - Miss

TL - Target Lost

The ranges are expressed kilometers. Example: 0.187 = 187 meters

1. Ambrose

Ambrose 3-1 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Sha	Cav w/Spring	Springfield	MS	258	0.086	0.187	0.150
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	3	0.124	0.152	0.137
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1021	0.077	0.197	0.153
1	Indian w/Smo	Cav w/Spring	Springfield	MS	204	0.079	0.187	0.152
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1806	0.069	0.187	0.152
1	Indian w/Rif	Cav w/Spring	Springfield	MS	242	0.079	0.186	0.150
1	Indian w/Spr	Cav w/Spring	Springfield	MS	116	0.081	0.185	0.151
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	21	0.075	0.173	0.135
1	Indian w/Smo	Cav w/Spring	Springfield	KK	13	0.081	0.163	0.116
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	56	0.090	0.186	0.149
1	Indian w/Rif	Cav w/Spring	Springfield	KK	24	0.074	0.177	0.116
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	5	0.079	0.184	0.138
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	51	0.077	0.176	0.130
1	Indian w/Win	Cav w/Spring	Winchester .	KK	72	0.075	0.179	0.132
1	Indian w/Spr	Cav w/Spring	Springfield	TL	8	0.103	0.182	0.156
1	Indian w/Win	Cav w/Spring	Winchester .	TL	35	0.069	0.185	0.152
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	24	0.098	0.180	0.149
1	Indian w/Spr	Cav w/Spring	Springfield	KK	14	0.088	0.176	0.117
1	Indian w/Bow	Cav w/Spring	45CAL	MS	394	0.021	0.069	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	78	0.030	0.062	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	KK	9	0.024	0.045	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	1	0.039	0.039	0.039
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	7	0.074	0.172	0.146
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	5	0.082	0.155	0.113
1	Indian w/Smo	Cav w/Spring	Springfield	TL	12	0.074	0.186	0.143

Ambrose 3-1 Direct Fire Effects (con't)

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	34	0.083	0.188	0.161
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	7	0.038	0.049	0.045
1	Indian w/Bow	Cav w/Spring	45CAL	TL	8	0.030	0.045	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	FP	7	0.040	0.050	0.044
1	Indian w/Sha	Cav w/Spring	Springfield	KK	16	0.078	0.164	0.113
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	6	0.142	0.177	0.155
1	Indian w/Sha	Cav w/Spring	Springfield	TL	6	0.081	0.182	0.134
1	Indian w/Rif	Cav w/Spring	Springfield	TL	8	0.109	0.184	0.141
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	1	0.176	0.176	0.176
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	1	0.119	0.119	0.119
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	5	0.100	0.159	0.122
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	6	0.087	0.173	0.127
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1598	0.035	0.343	0.107
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	74	0.037	0.360	0.106
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	106	0.044	0.344	0.112
2	Cav w/Spring	Indian w/Bow	Springfield	KK	521	0.038	0.349	0.105
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	3	0.043	0.057	0.050
2	Cav w/Spring	Indian w/Bow	Springfield	TL	61	0.047	0.364	0.133
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	26	0.037	0.050	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	93	0.038	0.050	0.046
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	3	0.043	0.050	0.047
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	5	0.041	0.049	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	2	0.045	0.047	0.046
2	Cav w/Spring	Indian w/Win	Springfield	MS	47	0.076	0.392	0.165
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	3	0.095	0.180	0.125
2	Cav w/Spring	Indian w/Rif	Springfield	MS	48	0.047	0.356	0.155
2	Cav w/Spring	Indian w/Hen	Springfield	MS	45	0.090	0.379	0.186
2	Cav w/Spring	Indian w/Smo	Springfield	MS	56	0.056	0.368	0.181
2	Cav w/Spring	Indian w/Sha	Colt 1873	KK	1	0.021	0.021	0.021
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	1	0.007	0.007	0.007
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Rif	Springfield	KK	31	0.049	0.371	0.225
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	3	0.057	0.346	0.245
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	1	0.034	0.034	0.034
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Smo	Springfield	KK	27	0.060	0.367	0.256
2	Cav w/Spring	Indian w/Spr	Springfield	MS	13	0.082	0.333	0.188

2	Cav w/Spring	Indian w/Sha	Springfield	MS	13	0.080	0.363	0.166
2	Cav w/Spring	Indian w/Sha	Springfield	KK	9	0.091	0.346	0.230
2	Cav w/Spring	Indian w/Win	Springfield	SUS	12	0.094	0.395	0.289
2	Cav w/Spring	Indian w/Win	Springfield	KK	35	0.081	0.386	0.232
2	Cav w/Spring	Indian w/Hen	Springfield	KK	26	0.116	0.377	0.279
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	2	0.165	0.332	0.249
2	Cav w/Spring	Indian w/Rif	Springfield	TL	2	0.096	0.097	0.096
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	15	0.096	0.339	0.284
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	6	0.094	0.354	0.291
2	Cav w/Spring	Indian w/Spr	Springfield	KK	6	0.085	0.381	0.250
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	1	0.091	0.091	0.091
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	13	0.091	0.365	0.316
2	Cav w/Spring	Indian w/Win	Springfield	DUD	3	0.102	0.341	0.198
2	Cav w/Spring	Indian w/Hen	Springfield	TL	5	0.121	0.342	0.287
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	5	0.299	0.328	0.314
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	5	0.283	0.370	0.319
2	Cav w/Spring	Indian w/Smo	Springfield	TL	2	0.326	0.327	0.327

Ambrose 3-2 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	39	0.110	0.182	0.154
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1850	0.070	0.185	0.147
1	Indian w/Sha	Cav w/Spring	Springfield	MS	250	0.079	0.185	0.142
1	Indian w/Smo	Cav w/Spring	Springfield	MS	242	0.094	0.186	0.148
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	33	0.105	0.184	0.150
1	Indian w/Smo	Cav w/Spring	Springfield	KK	16	0.085	0.181	0.115
1	Indian w/Win	Cav w/Spring	Winchester .	KK	59	0.071	0.181	0.129
1	Indian w/Rif	Cav w/Spring	Springfield	MS	265	0.077	0.185	0.145
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	9	0.107	0.181	0.147
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1251	0.065	0.189	0.148
1	Indian w/Spr	Cav w/Spring	Springfield	MS	128	0.073	0.186	0.146
1	Indian w/Rif	Cav w/Spring	Springfield	KK	22	0.091	0.164	0.120
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	74	0.074	0.182	0.145
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	51	0.078	0.179	0.125
1	Indian w/Sha	Cav w/Spring	Springfield	TL	7	0.126	0.179	0.149
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	22	0.090	0.166	0.126
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	11	0.111	0.183	0.159
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	8	0.091	0.153	0.128
1	Indian w/Win	Cav w/Spring	Winchester .	TL	28	0.071	0.182	0.139
1	Indian w/Sha	Cav w/Spring	Springfield	KK	23	0.086	0.162	0.116
1	Indian w/Smo	Cav w/Spring	Springfield	TL	6	0.104	0.174	0.139
1	Indian w/Bow	Cav w/Spring	45CAL	MS	375	0.024	0.052	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	57	0.028	0.056	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	6	0.031	0.041	0.037
1	Indian w/Bow	Cav w/Spring	45CAL	KK	12	0.023	0.049	0.040
1	Indian w/Bow	Cav w/Spring	45CAL	FP	3	0.030	0.045	0.038
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	6	0.116	0.183	0.153
1	Indian w/Bow	Cav w/Spring	45CAL	TL	4	0.040	0.047	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	1	0.040	0.040	0.040
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	6	0.134	0.184	0.162
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	5	0.105	0.167	0.130
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	8	0.091	0.170	0.116
1	Indian w/Spr	Cav w/Spring	Springfield	KK	16	0.088	0.151	0.112
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	1	0.099	0.099	0.099
1	Indian w/Spr	Cav w/Spring	Springfield	TL	2	0.111	0.177	0.144
1	Indian w/Rif	Cav w/Spring	Springfield	TL	1	0.105	0.105	0.105
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1373	0.037	0.358	0.110
2	Cav w/Spring	Indian w/Bow	Springfield	KK	516	0.048	0.364	0.107
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	76	0.042	0.362	0.116
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	83	0.067	0.367	0.122
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	95	0.029	0.051	0.043
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	10	0.032	0.050	0.045
2	Cav w/Spring	Indian w/Bow	Springfield	TL	54	0.050	0.341	0.134
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	9	0.031	0.051	0.043
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	26	0.031	0.050	0.042
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	5	0.031	0.050	0.043
2	Cav w/Spring	Indian w/Hen	Springfield	MS	61	0.044	0.371	0.218
2	Cav w/Spring	Indian w/Rif	Springfield	MS	44	0.072	0.369	0.195
2	Cav w/Spring	Indian w/Win	Springfield	KK	37	0.039	0.347	0.155
2	Cav w/Spring	Indian w/Smo	Springfield	MS	48	0.045	0.360	0.163
2	Cav w/Spring	Indian w/Sha	Springfield	MS	17	0.091	0.321	0.175
2	Cav w/Spring	Indian w/Smo	Springfield	KK	39	0.039	0.357	0.215
2	Cav w/Spring	Indian w/Win	Springfield	MS	60	0.045	0.341	0.189
2	Cav w/Spring	Indian w/Rif	Springfield	KK	35	0.040	0.368	0.157
2	Cav w/Spring	Indian w/Sha	Springfield	KK	18	0.047	0.351	0.190

2	Cav w/Spring	Indian w/Win	Springfield	SUS	20	0.041	0.341	0.243
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	2	0.091	0.226	0.159
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	9	0.043	0.363	0.208
2	Cav w/Spring	Indian w/Win	Springfield	DUD	5	0.087	0.341	0.240
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	22	0.066	0.333	0.206
2	Cav w/Spring	Indian w/Spr	Springfield	MS	12	0.042	0.364	0.224
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	3	0.119	0.336	0.261
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	2	0.103	0.159	0.131
2	Cav w/Spring	Indian w/Win	Springfield	TL	2	0.080	0.087	0.084
2	Cav w/Spring	Indian w/Spr	Springfield	KK	9	0.044	0.366	0.240
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	16	0.042	0.359	0.283
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	2	0.086	0.111	0.099
2	Cav w/Spring	Indian w/Hen	Springfield	KK	32	0.041	0.386	0.221
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	5	0.075	0.333	0.251
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	1	0.095	0.095	0.095
2	Cav w/Spring	Indian w/Spr	Springfield	TL	1	0.318	0.318	0.318
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	1	0.339	0.339	0.339
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.036	0.036	0.036
2	Cav w/Spring	Indian w/Smo	Springfield	TL	1	0.332	0.332	0.332
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	1	0.021	0.021	0.021
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	1	0.042	0.042	0.042
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	3	0.045	0.047	0.046
2	Cav w/Spring	Indian w/Spr	Colt 1873	MS	2	0.042	0.042	0.042
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.042	0.042	0.042
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	2	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	1	0.038	0.038	0.038

Ambrose 3-3 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1458	0.062	0.185	0.152
1	Indian w/Rif	Cav w/Spring	Springfield	MS	227	0.067	0.186	0.146
1	Indian w/Sha	Cav w/Spring	Springfield	MS	218	0.081	0.195	0.149
1	Indian w/Smo	Cav w/Spring	Springfield	MS	184	0.076	0.185	0.148
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	761	0.074	0.193	0.150
1	Indian w/Smo	Cav w/Spring	Springfield	KK	19	0.093	0.180	0.124
1	Indian w/Spr	Cav w/Spring	Springfield	MS	103	0.079	0.186	0.152
1	Indian w/Win	Cav w/Spring	Winchester .	TL	18	0.102	0.185	0.139
1	Indian w/Sha	Cav w/Spring	Springfield	KK	21	0.079	0.174	0.122
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	42	0.073	0.184	0.142
1	Indian w/Win	Cav w/Spring	Winchester .	KK	83	0.068	0.181	0.123
1	Indian w/Spr	Cav w/Spring	Springfield	KK	9	0.080	0.155	0.116
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	13	0.081	0.165	0.129
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	32	0.086	0.184	0.146
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	20	0.099	0.189	0.161
1	Indian w/Spr	Cav w/Spring	Springfield	TL	5	0.096	0.178	0.152
1	Indian w/Sha	Cav w/Spring	Springfield	TL	3	0.146	0.164	0.157
1	Indian w/Bow	Cav w/Spring	45CAL	MS	343	0.000	0.062	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	63	0.009	0.061	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	KK	14	0.012	0.050	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	6	0.007	0.046	0.034
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	3	0.039	0.041	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	FP	1	0.041	0.041	0.041
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	4	0.120	0.179	0.161
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	37	0.070	0.173	0.115
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	5	0.080	0.162	0.115
1	Indian w/Rif	Cav w/Spring	Springfield	KK	16	0.068	0.144	0.106
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	3	0.098	0.156	0.137
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	3	0.108	0.110	0.109
1	Indian w/Bow	Cav w/Spring	45CAL	TL	5	0.024	0.049	0.036
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	11	0.084	0.179	0.132
1	Indian w/Smo	Cav w/Spring	Springfield	TL	11	0.089	0.182	0.150
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	8	0.100	0.169	0.143
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	8	0.101	0.166	0.127
1	Indian w/Rif	Cav w/Spring	Springfield	TL	4	0.140	0.176	0.162
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	2	0.079	0.085	0.082
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1396	0.034	0.327	0.108
2	Cav w/Spring	Indian w/Hen	Springfield	MS	72	0.043	0.340	0.162

2	Cav w/Spring	Indian w/Hen	Springfield	KK	51	0.034	0.348	0.150
2	Cav w/Spring	Indian w/Smo	Springfield	MS	50	0.047	0.328	0.162
2	Cav w/Spring	Indian w/Win	Springfield	MS	54	0.061	0.317	0.165
2	Cav w/Spring	Indian w/Rif	Springfield	MS	42	0.048	0.329	0.181
2	Cav w/Spring	Indian w/Sha	Springfield	MS	17	0.086	0.316	0.143
2	Cav w/Spring	Indian w/Spr	Springfield	MS	5	0.101	0.214	0.145
2	Cav w/Spring	Indian w/Rif	Springfield	KK	56	0.037	0.321	0.131
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	5	0.097	0.315	0.238
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	89	0.048	0.310	0.112
2	Cav w/Spring	Indian w/Win	Springfield	SUS	12	0.050	0.314	0.168
2	Cav w/Spring	Indian w/Bow	Springfield	KK	520	0.037	0.312	0.105
2	Cav w/Spring	Indian w/Win	Springfield	KK	60	0.037	0.316	0.130
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	6	0.113	0.322	0.222
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	63	0.047	0.305	0.107
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	86	0.034	0.053	0.045
2	Cav w/Spring	Indian w/Bow	Springfield	TL	58	0.045	0.318	0.117
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	4	0.039	0.048	0.043
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	1	0.048	0.048	0.048
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	6	0.037	0.049	0.046
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	4	0.038	0.048	0.042
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	27	0.020	0.050	0.042
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	4	0.024	0.043	0.038
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	2	0.026	0.043	0.034
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	2	0.036	0.045	0.041
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	5	0.052	0.309	0.181
2	Cav w/Spring	Indian w/Spr	Springfield	KK	16	0.040	0.315	0.119
2	Cav w/Spring	Indian w/Smo	Springfield	KK	50	0.040	0.333	0.141
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	4	0.047	0.121	0.093
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	5	0.052	0.297	0.163
2	Cav w/Spring	Indian w/Win	Springfield	TL	3	0.101	0.312	0.240
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	13	0.042	0.314	0.159
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	17	0.081	0.339	0.266
2	Cav w/Spring	Indian w/Sha	Springfield	KK	16	0.039	0.316	0.152
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	2	0.103	0.309	0.206
2	Cav w/Spring	Indian w/Rif	Springfield	TL	3	0.112	0.310	0.242
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	12	0.044	0.329	0.193
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	2	0.035	0.038	0.037
2	Cav w/Spring	Indian w/Win	Colt 1873	MOB	1	0.034	0.034	0.034
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	4	0.045	0.047	0.047
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	2	0.034	0.041	0.038
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	3	0.035	0.036	0.036
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	1	0.036	0.036	0.036
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	2	0.054	0.315	0.184
2	Cav w/Spring	Indian w/Hen	Colt 1873	FP	1	0.045	0.045	0.045
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	2	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Smo	Colt 1873	MFP	1	0.041	0.041	0.041
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.043	0.043	0.043
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	1	0.043	0.043	0.043
2	Cav w/Spring	Indian w/Win	Springfield	DUD	1	0.086	0.086	0.086

Ambrose 3-4 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Smo	Cav w/Spring	Springfield	MS	262	0.084	0.191	0.150
1	Indian w/Spr	Cav w/Spring	Springfield	MS	147	0.084	0.185	0.146
1	Indian w/Rif	Cav w/Spring	Springfield	MS	298	0.080	0.185	0.149
1	Indian w/Sha	Cav w/Spring	Springfield	MS	301	0.078	0.185	0.143
1	Indian w/Sha	Cav w/Spring	Springfield	KK	20	0.077	0.159	0.116
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1421	0.078	0.193	0.155
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1918	0.082	0.186	0.155
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	12	0.099	0.161	0.135
1	Indian w/Win	Cav w/Spring	Winchester .	KK	57	0.080	0.179	0.137
1	Indian w/Win	Cav w/Spring	Winchester .	TL	30	0.117	0.184	0.157
1	Indian w/Rif	Cav w/Spring	Springfield	KK	27	0.077	0.164	0.107
1	Indian w/Smo	Cav w/Spring	Springfield	KK	26	0.077	0.171	0.110
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	42	0.091	0.178	0.130
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	55	0.103	0.185	0.156
1	Indian w/Spr	Cav w/Spring	Springfield	TL	3	0.135	0.179	0.154
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	40	0.106	0.184	0.152
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	36	0.101	0.184	0.155
1	Indian w/Bow	Cav w/Spring	45CAL	MS	353	0.029	0.060	0.044
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	49	0.035	0.049	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	FP	2	0.039	0.049	0.044
1	Indian w/Bow	Cav w/Spring	45CAL	KK	11	0.031	0.049	0.040
1	Indian w/Bow	Cav w/Spring	45CAL	TL	3	0.031	0.049	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	2	0.048	0.049	0.049

1	Indian w/Bow	Cav w/Spring	45CAL	MFP	9	0.032	0.048	0.042
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	7	0.101	0.183	0.142
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	16	0.080	0.184	0.145
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	10	0.105	0.183	0.146
1	Indian w/Rif	Cav w/Spring	Springfield	TL	8	0.133	0.184	0.151
1	Indian w/Smo	Cav w/Spring	Springfield	TL	8	0.099	0.184	0.163
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	4	0.097	0.184	0.146
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	10	0.099	0.167	0.139
1	Indian w/Sha	Cav w/Spring	Springfield	TL	7	0.093	0.184	0.140
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	2	0.090	0.109	0.100
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	5	0.093	0.104	0.098
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	5	0.099	0.148	0.125
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	5	0.070	0.148	0.105
1	Indian w/Spr	Cav w/Spring	Springfield	KK	11	0.078	0.140	0.100
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1505	0.033	0.253	0.105
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	74	0.038	0.137	0.098
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	95	0.055	0.216	0.107
2	Cav w/Spring	Indian w/Bow	Springfield	KK	519	0.018	0.234	0.102
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	77	0.023	0.050	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	3	0.047	0.050	0.048
2	Cav w/Spring	Indian w/Bow	Springfield	TL	56	0.048	0.149	0.108
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	38	0.011	0.057	0.042
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	5	0.041	0.049	0.046
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	3	0.040	0.050	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	1	0.040	0.040	0.040
2	Cav w/Spring	Indian w/Win	Springfield	MS	57	0.016	0.220	0.120
2	Cav w/Spring	Indian w/Hen	Springfield	MS	52	0.042	0.259	0.137
2	Cav w/Spring	Indian w/Spr	Springfield	MS	17	0.090	0.199	0.131
2	Cav w/Spring	Indian w/Sha	Springfield	MS	14	0.057	0.211	0.105
2	Cav w/Spring	Indian w/Rif	Springfield	MS	47	0.039	0.238	0.120
2	Cav w/Spring	Indian w/Smo	Springfield	MS	49	0.039	0.247	0.126
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	4	0.022	0.046	0.033
2	Cav w/Spring	Indian w/Hen	Springfield	KK	27	0.017	0.245	0.063
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	2	0.028	0.046	0.037
2	Cav w/Spring	Indian w/Smo	Springfield	KK	24	0.020	0.194	0.096
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	7	0.020	0.136	0.080
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	5	0.036	0.181	0.092
2	Cav w/Spring	Indian w/Win	Springfield	KK	42	0.035	0.165	0.085
2	Cav w/Spring	Indian w/Win	Springfield	SUS	7	0.038	0.217	0.107
2	Cav w/Spring	Indian w/Spr	Springfield	KK	7	0.037	0.099	0.064
2	Cav w/Spring	Indian w/Rif	Springfield	KK	25	0.028	0.140	0.070
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.062	0.062	0.062
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	1	0.067	0.067	0.067
2	Cav w/Spring	Indian w/Sha	Springfield	KK	11	0.037	0.228	0.096
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	2	0.108	0.128	0.118
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	2	0.094	0.138	0.116
2	Cav w/Spring	Indian w/Win	Springfield	DUD	2	0.093	0.093	0.093
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	2	0.087	0.096	0.091
2	Cav w/Spring	Indian w/Rif	Springfield	TL	1	0.092	0.092	0.092
2	Cav w/Spring	Indian w/Smo	Springfield	TL	1	0.122	0.122	0.122
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	5	0.043	0.129	0.087
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	2	0.037	0.102	0.069
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.040	0.040	0.040
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	3	0.036	0.036	0.036

Ambrose 3-5 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	KK	64	0.066	0.179	0.135
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1865	0.070	0.185	0.154
1	Indian w/Smo	Cav w/Spring	Springfield	MS	261	0.082	0.214	0.149
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1376	0.075	0.220	0.157
1	Indian w/Sha	Cav w/Spring	Springfield	MS	317	0.080	0.186	0.145
1	Indian w/Rif	Cav w/Spring	Springfield	MS	282	0.071	0.185	0.147
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	7	0.116	0.184	0.154
1	Indian w/Spr	Cav w/Spring	Springfield	TL	6	0.091	0.167	0.142
1	Indian w/Rif	Cav w/Spring	Springfield	KK	33	0.081	0.166	0.122
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	5	0.105	0.147	0.121
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	12	0.089	0.185	0.161
1	Indian w/Spr	Cav w/Spring	Springfield	MS	154	0.079	0.214	0.148
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	65	0.109	0.185	0.154
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	12	0.081	0.169	0.141
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	38	0.079	0.180	0.129
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	46	0.103	0.213	0.156
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	10	0.107	0.183	0.152
1	Indian w/Sha	Cav w/Spring	Springfield	KK	26	0.086	0.173	0.114

1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	15	0.134	0.179	0.165
1	Indian w/Bow	Cav w/Spring	45CAL	MS	994	0.019	0.053	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	KK	16	0.018	0.050	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	86	0.022	0.050	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	15	0.019	0.047	0.035
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	2	0.039	0.045	0.042
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	18	0.074	0.173	0.140
1	Indian w/Smo	Cav w/Spring	Springfield	TL	5	0.093	0.181	0.144
1	Indian w/Bow	Cav w/Spring	45CAL	TL	14	0.024	0.048	0.037
1	Indian w/Bow	Cav w/Spring	45CAL	FP	1	0.032	0.032	0.032
1	Indian w/Sha	Cav w/Spring	Springfield	TL	2	0.089	0.184	0.136
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	5	0.095	0.158	0.129
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	5	0.125	0.215	0.173
1	Indian w/Win	Cav w/Spring	Winchester .	TL	15	0.110	0.185	0.144
1	Indian w/Rif	Cav w/Spring	Springfield	TL	4	0.124	0.184	0.156
1	Indian w/Smo	Cav w/Spring	Springfield	KK	11	0.080	0.167	0.123
1	Indian w/Spr	Cav w/Spring	Springfield	KK	12	0.083	0.146	0.109
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	4	0.098	0.148	0.111
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	2	0.115	0.168	0.142
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1549	0.032	0.362	0.110
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	79	0.044	0.163	0.104
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	101	0.046	0.357	0.118
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	101	0.037	0.058	0.046
2	Cav w/Spring	Indian w/Bow	Springfield	KK	523	0.037	0.362	0.109
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	4	0.039	0.047	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	23	0.038	0.052	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	7	0.040	0.049	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	5	0.039	0.047	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	2	0.039	0.045	0.042
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	1	0.042	0.042	0.042
2	Cav w/Spring	Indian w/Hen	Springfield	MS	87	0.094	0.416	0.199
2	Cav w/Spring	Indian w/Win	Springfield	MS	52	0.044	0.398	0.153
2	Cav w/Spring	Indian w/Rif	Springfield	MS	50	0.067	0.355	0.174
2	Cav w/Spring	Indian w/Smo	Springfield	MS	61	0.077	0.391	0.163
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	4	0.041	0.050	0.047
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	4	0.028	0.045	0.040
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	3	0.036	0.050	0.043
2	Cav w/Spring	Indian w/Bow	Springfield	TL	56	0.071	0.360	0.140
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	1	0.036	0.036	0.036
2	Cav w/Spring	Indian w/Smo	Springfield	KK	48	0.041	0.388	0.195
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.012	0.012	0.012
2	Cav w/Spring	Indian w/Rif	Springfield	KK	44	0.041	0.374	0.154
2	Cav w/Spring	Indian w/Sha	Springfield	KK	19	0.042	0.335	0.166
2	Cav w/Spring	Indian w/Hen	Springfield	KK	40	0.042	0.396	0.221
2	Cav w/Spring	Indian w/Win	Springfield	KK	54	0.043	0.347	0.142
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	8	0.098	0.363	0.218
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	3	0.096	0.338	0.214
2	Cav w/Spring	Indian w/Spr	Springfield	MS	12	0.093	0.324	0.174
2	Cav w/Spring	Indian w/Win	Springfield	SUS	27	0.043	0.397	0.219
2	Cav w/Spring	Indian w/Sha	Springfield	MS	17	0.081	0.398	0.193
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	16	0.042	0.334	0.193
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	19	0.042	0.366	0.242
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	3	0.101	0.351	0.190
2	Cav w/Spring	Indian w/Smo	Springfield	TL	1	0.098	0.098	0.098
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.043	0.043	0.043
2	Cav w/Spring	Indian w/Spr	Springfield	KK	8	0.043	0.330	0.200
2	Cav w/Spring	Indian w/Spr	Colt 1873	MFP	1	0.043	0.043	0.043
2	Cav w/Spring	Indian w/Win	Springfield	DUD	1	0.096	0.096	0.096
2	Cav w/Spring	Indian w/Win	Springfield	TL	2	0.101	0.329	0.215
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	13	0.293	0.387	0.335
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.352	0.352	0.352
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	2	0.044	0.046	0.045
2	Cav w/Spring	Indian w/Smo	Colt 1873	FP	1	0.046	0.046	0.046
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	1	0.043	0.043	0.043
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.300	0.300	0.300
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	2	0.043	0.074	0.058
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	1	0.068	0.068	0.068

Ambrose 3-6 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1874	0.069	0.186	0.149
1	Indian w/Smo	Cav w/Spring	Springfield	MS	224	0.078	0.185	0.150
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1089	0.073	0.197	0.155
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	10	0.087	0.183	0.141
1	Indian w/Rif	Cav w/Spring	Springfield	MS	259	0.076	0.185	0.146

1	Indian w/Win	Cav w/Spring	Winchester .	SUS	17	0.093	0.173	0.134
1	Indian w/Sha	Cav w/Spring	Springfield	MS	291	0.083	0.184	0.141
1	Indian w/Rif	Cav w/Spring	Springfield	KK	22	0.084	0.163	0.120
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	34	0.092	0.187	0.152
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	41	0.087	0.192	0.146
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	11	0.126	0.184	0.160
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	11	0.090	0.184	0.151
1	Indian w/Spr	Cav w/Spring	Springfield	KK	7	0.091	0.151	0.111
1	Indian w/Rif	Cav w/Spring	Springfield	TL	6	0.099	0.184	0.159
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	58	0.085	0.177	0.125
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	10	0.089	0.182	0.134
1	Indian w/Spr	Cav w/Spring	Springfield	MS	125	0.088	0.185	0.146
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	73	0.069	0.184	0.146
1	Indian w/Win	Cav w/Spring	Winchester .	KK	54	0.077	0.178	0.128
1	Indian w/Win	Cav w/Spring	Winchester .	TL	28	0.114	0.179	0.146
1	Indian w/Smo	Cav w/Spring	Springfield	KK	21	0.080	0.177	0.112
1	Indian w/Bow	Cav w/Spring	45CAL	MS	830	0.017	0.061	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	75	0.019	0.050	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	TL	23	0.023	0.049	0.037
1	Indian w/Bow	Cav w/Spring	45CAL	KK	16	0.021	0.047	0.037
1	Indian w/Bow	Cav w/Spring	45CAL	FP	2	0.041	0.044	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	2	0.037	0.037	0.037
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	19	0.027	0.050	0.040
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	5	0.092	0.169	0.120
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	4	0.080	0.111	0.094
1	Indian w/Sha	Cav w/Spring	Springfield	KK	18	0.079	0.165	0.115
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	7	0.106	0.183	0.156
1	Indian w/Smo	Cav w/Spring	Springfield	TL	3	0.103	0.184	0.136
1	Indian w/Spr	Cav w/Spring	Springfield	TL	9	0.108	0.176	0.149
1	Indian w/Sha	Cav w/Spring	Springfield	TL	5	0.133	0.182	0.153
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	5	0.093	0.166	0.118
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	1	0.157	0.157	0.157
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1335	0.033	0.375	0.109
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	48	0.050	0.177	0.097
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	103	0.049	0.362	0.126
2	Cav w/Spring	Indian w/Bow	Springfield	KK	522	0.033	0.364	0.108
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	26	0.034	0.050	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	95	0.034	0.057	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	2	0.049	0.050	0.049
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	2	0.040	0.045	0.042
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	2	0.037	0.049	0.043
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	1	0.047	0.047	0.047
2	Cav w/Spring	Indian w/Win	Springfield	MS	56	0.035	0.397	0.186
2	Cav w/Spring	Indian w/Smo	Springfield	MS	38	0.089	0.378	0.205
2	Cav w/Spring	Indian w/Rif	Springfield	KK	32	0.016	0.384	0.230
2	Cav w/Spring	Indian w/Rif	Springfield	MS	40	0.076	0.367	0.187
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	2	0.114	0.332	0.223
2	Cav w/Spring	Indian w/Win	Springfield	KK	34	0.038	0.372	0.219
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	2	0.119	0.348	0.234
2	Cav w/Spring	Indian w/Sha	Springfield	MS	12	0.088	0.368	0.246
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	1	0.020	0.020	0.020
2	Cav w/Spring	Indian w/Hen	Springfield	KK	36	0.038	0.402	0.281
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Spr	Springfield	KK	7	0.063	0.360	0.225
2	Cav w/Spring	Indian w/Hen	Springfield	MS	54	0.061	0.394	0.221
2	Cav w/Spring	Indian w/Sha	Springfield	KK	9	0.085	0.353	0.225
2	Cav w/Spring	Indian w/Smo	Springfield	KK	30	0.069	0.387	0.277
2	Cav w/Spring	Indian w/Spr	Springfield	MS	9	0.108	0.390	0.237
2	Cav w/Spring	Indian w/Bow	Springfield	TL	76	0.076	0.377	0.139
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	12	0.109	0.386	0.311
2	Cav w/Spring	Indian w/Win	Springfield	SUS	15	0.093	0.385	0.269
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	11	0.101	0.380	0.302
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	4	0.092	0.360	0.220
2	Cav w/Spring	Indian w/Rif	Springfield	TL	1	0.093	0.093	0.093
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	10	0.125	0.392	0.324
2	Cav w/Spring	Indian w/Win	Springfield	DUD	2	0.093	0.355	0.224
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	5	0.105	0.330	0.276
2	Cav w/Spring	Indian w/Smo	Springfield	TL	2	0.112	0.341	0.226
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	3	0.290	0.320	0.310
2	Cav w/Spring	Indian w/Win	Springfield	TL	1	0.315	0.315	0.315
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.364	0.364	0.364

Ambrose 3-7 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	993	0.065	0.220	0.156

1	Indian w/Smo	Cav w/Spring	Springfield	MS	193	0.069	0.213	0.154
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	5	0.107	0.184	0.133
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1479	0.058	0.195	0.153
1	Indian w/Rif	Cav w/Spring	Springfield	MS	228	0.069	0.201	0.149
1	Indian w/Spr	Cav w/Spring	Springfield	MS	103	0.076	0.206	0.150
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	49	0.072	0.180	0.127
1	Indian w/Rif	Cav w/Spring	Springfield	TL	3	0.085	0.145	0.118
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	5	0.145	0.184	0.166
1	Indian w/Win	Cav w/Spring	Winchester .	KK	76	0.064	0.173	0.120
1	Indian w/Win	Cav w/Spring	Winchester .	TL	19	0.058	0.184	0.133
1	Indian w/Sha	Cav w/Spring	Springfield	MS	196	0.078	0.195	0.148
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	3	0.096	0.164	0.137
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	11	0.104	0.161	0.135
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	33	0.084	0.187	0.155
1	Indian w/Rif	Cav w/Spring	Springfield	KK	13	0.074	0.157	0.107
1	Indian w/Sha	Cav w/Spring	Springfield	KK	23	0.081	0.162	0.106
1	Indian w/Sha	Cav w/Spring	Springfield	TL	9	0.134	0.184	0.152
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	44	0.072	0.187	0.152
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	14	0.079	0.161	0.128
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	24	0.102	0.222	0.154
1	Indian w/Smo	Cav w/Spring	Springfield	KK	16	0.091	0.173	0.121
1	Indian w/Bow	Cav w/Spring	45CAL	MS	528	0.012	0.052	0.040
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	58	0.027	0.050	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	8	0.027	0.045	0.036
1	Indian w/Bow	Cav w/Spring	45CAL	KK	15	0.015	0.048	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	3	0.035	0.047	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	TL	19	0.027	0.042	0.035
1	Indian w/Bow	Cav w/Spring	45CAL	FP	2	0.041	0.044	0.043
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	2	0.144	0.181	0.163
1	Indian w/Spr	Cav w/Spring	Springfield	TL	7	0.100	0.180	0.147
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	7	0.106	0.201	0.160
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	4	0.103	0.179	0.139
1	Indian w/Spr	Cav w/Spring	Springfield	KK	8	0.095	0.168	0.113
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	2	0.114	0.151	0.133
1	Indian w/Smo	Cav w/Spring	Springfield	TL	1	0.138	0.138	0.138
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1312	0.031	0.366	0.109
2	Cav w/Spring	Indian w/Bow	Springfield	KK	526	0.037	0.362	0.108
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	68	0.041	0.324	0.110
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	106	0.033	0.051	0.045
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	121	0.052	0.352	0.124
2	Cav w/Spring	Indian w/Bow	Springfield	TL	76	0.037	0.362	0.176
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	4	0.045	0.050	0.049
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	2	0.046	0.050	0.048
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	21	0.035	0.049	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	7	0.038	0.050	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	2	0.046	0.048	0.047
2	Cav w/Spring	Indian w/Rif	Springfield	MS	59	0.047	0.357	0.227
2	Cav w/Spring	Indian w/Win	Springfield	MS	62	0.078	0.348	0.212
2	Cav w/Spring	Indian w/Spr	Springfield	MS	20	0.045	0.365	0.204
2	Cav w/Spring	Indian w/Hen	Springfield	MS	53	0.042	0.363	0.232
2	Cav w/Spring	Indian w/Win	Springfield	DUD	7	0.046	0.329	0.198
2	Cav w/Spring	Indian w/Win	Springfield	KK	78	0.034	0.347	0.177
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	1	0.025	0.025	0.025
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	2	0.029	0.044	0.037
2	Cav w/Spring	Indian w/Spr	Springfield	KK	16	0.038	0.342	0.190
2	Cav w/Spring	Indian w/Sha	Springfield	KK	27	0.040	0.349	0.169
2	Cav w/Spring	Indian w/Rif	Springfield	KK	60	0.043	0.353	0.175
2	Cav w/Spring	Indian w/Hen	Springfield	KK	69	0.011	0.371	0.189
2	Cav w/Spring	Indian w/Smo	Springfield	MS	50	0.043	0.369	0.221
2	Cav w/Spring	Indian w/Smo	Springfield	KK	59	0.042	0.366	0.202
2	Cav w/Spring	Indian w/Sha	Springfield	MS	19	0.082	0.349	0.241
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	4	0.109	0.320	0.264
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	5	0.088	0.360	0.230
2	Cav w/Spring	Indian w/Win	Springfield	TL	3	0.102	0.328	0.252
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	20	0.054	0.357	0.263
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	9	0.071	0.356	0.203
2	Cav w/Spring	Indian w/Win	Springfield	SUS	28	0.054	0.341	0.276
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	29	0.044	0.350	0.279
2	Cav w/Spring	Indian w/Smo	Springfield	TL	8	0.295	0.359	0.321
2	Cav w/Spring	Indian w/Spr	Springfield	TL	2	0.292	0.317	0.304
2	Cav w/Spring	Indian w/Rif	Springfield	TL	6	0.300	0.330	0.318
2	Cav w/Spring	Indian w/Hen	Springfield	TL	7	0.318	0.346	0.327
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	2	0.036	0.042	0.039
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	2	0.041	0.042	0.042
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	17	0.045	0.340	0.283
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	3	0.043	0.044	0.044
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	7	0.075	0.352	0.287
2	Cav w/Spring	Indian w/Win	Colt 1873	TL	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	3	0.302	0.309	0.306

2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	6	0.042	0.049	0.047
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	3	0.100	0.336	0.255
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	2	0.045	0.049	0.047
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	3	0.041	0.042	0.042
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	2	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.046	0.046	0.046
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	1	0.049	0.049	0.049

Ambrose 3-8 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Rif	Cav w/Spring	Springfield	MS	264	0.078	0.186	0.149
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1124	0.069	0.196	0.158
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1509	0.072	0.185	0.158
1	Indian w/Smo	Cav w/Spring	Springfield	MS	229	0.088	0.186	0.151
1	Indian w/Win	Cav w/Spring	Winchester .	KK	57	0.071	0.178	0.136
1	Indian w/Spr	Cav w/Spring	Springfield	MS	126	0.080	0.185	0.149
1	Indian w/Sha	Cav w/Spring	Springfield	MS	283	0.075	0.185	0.145
1	Indian w/Win	Cav w/Spring	Winchester .	TL	23	0.128	0.181	0.156
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	8	0.112	0.184	0.159
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	11	0.084	0.180	0.135
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	39	0.082	0.185	0.151
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	43	0.102	0.183	0.156
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	50	0.079	0.180	0.127
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	25	0.068	0.192	0.158
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	3	0.123	0.162	0.145
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	20	0.075	0.174	0.138
1	Indian w/Rif	Cav w/Spring	Springfield	TL	6	0.104	0.181	0.153
1	Indian w/Smo	Cav w/Spring	Springfield	KK	20	0.083	0.183	0.121
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	2	0.120	0.145	0.133
1	Indian w/Sha	Cav w/Spring	Springfield	TL	2	0.134	0.167	0.151
1	Indian w/Bow	Cav w/Spring	45CAL	MS	324	0.029	0.052	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	64	0.030	0.049	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	KK	15	0.035	0.049	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	5	0.032	0.048	0.043
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	5	0.091	0.173	0.119
1	Indian w/Rif	Cav w/Spring	Springfield	KK	18	0.076	0.165	0.111
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	1	0.039	0.039	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	TL	2	0.039	0.041	0.040
1	Indian w/Bow	Cav w/Spring	45CAL	FP	1	0.040	0.040	0.040
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	8	0.105	0.179	0.148
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	6	0.073	0.174	0.117
1	Indian w/Sha	Cav w/Spring	Springfield	KK	33	0.074	0.174	0.119
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	7	0.137	0.169	0.156
1	Indian w/Spr	Cav w/Spring	Springfield	KK	8	0.083	0.151	0.109
1	Indian w/Spr	Cav w/Spring	Springfield	TL	5	0.079	0.175	0.145
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	6	0.090	0.139	0.115
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1595	0.036	0.371	0.111
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	29	0.037	0.052	0.044
2	Cav w/Spring	Indian w/Bow	Springfield	KK	521	0.043	0.373	0.109
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	63	0.049	0.358	0.109
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	102	0.053	0.378	0.134
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	70	0.037	0.064	0.046
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	5	0.047	0.050	0.049
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	3	0.047	0.049	0.048
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	3	0.038	0.048	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	5	0.042	0.048	0.045
2	Cav w/Spring	Indian w/Bow	Springfield	TL	72	0.042	0.380	0.186
2	Cav w/Spring	Indian w/Hen	Springfield	MS	72	0.042	0.381	0.221
2	Cav w/Spring	Indian w/Rif	Springfield	MS	50	0.077	0.389	0.251
2	Cav w/Spring	Indian w/Win	Springfield	DUD	12	0.051	0.352	0.229
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	1	0.049	0.049	0.049
2	Cav w/Spring	Indian w/Win	Springfield	MS	61	0.066	0.390	0.203
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	3	0.082	0.326	0.213
2	Cav w/Spring	Indian w/Sha	Springfield	MS	23	0.060	0.350	0.212
2	Cav w/Spring	Indian w/Smo	Springfield	MS	60	0.044	0.391	0.259
2	Cav w/Spring	Indian w/Win	Springfield	KK	57	0.035	0.370	0.222
2	Cav w/Spring	Indian w/Spr	Springfield	MS	15	0.082	0.379	0.196
2	Cav w/Spring	Indian w/Smo	Springfield	KK	51	0.042	0.387	0.233
2	Cav w/Spring	Indian w/Rif	Springfield	KK	57	0.042	0.383	0.208
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	19	0.109	0.383	0.284
2	Cav w/Spring	Indian w/Rif	Springfield	TL	5	0.089	0.355	0.237
2	Cav w/Spring	Indian w/Spr	Springfield	KK	14	0.061	0.357	0.240
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	3	0.041	0.046	0.044
2	Cav w/Spring	Indian w/Hen	Springfield	KK	51	0.041	0.377	0.248
2	Cav w/Spring	Indian w/Win	Springfield	SUS	20	0.044	0.393	0.274

2	Cav w/Spring	Indian w/Sha	Springfield	KK	20	0.043	0.394	0.231
2	Cav w/Spring	Indian w/Smo	Colt 1873	FP	1	0.041	0.041	0.041
2	Cav w/Spring	Indian w/Sha	Springfield	TL	2	0.313	0.335	0.324
2	Cav w/Spring	Indian w/Win	Springfield	TL	4	0.305	0.330	0.322
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	22	0.290	0.353	0.321
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	20	0.046	0.398	0.309
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	4	0.096	0.359	0.219
2	Cav w/Spring	Indian w/Smo	Springfield	TL	4	0.318	0.334	0.326
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.323	0.323	0.323
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	3	0.088	0.334	0.251
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	5	0.054	0.334	0.267
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	2	0.324	0.339	0.331
2	Cav w/Spring	Indian w/Hen	Springfield	TL	1	0.323	0.323	0.323
2	Cav w/Spring	Indian w/Spr	Springfield	TL	1	0.316	0.316	0.316
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.357	0.357	0.357
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Smo	Colt 1873	MFP	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	2	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	1	0.041	0.041	0.041

Ambrose 3-9 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1124	0.069	0.194	0.151
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	25	0.070	0.176	0.136
1	Indian w/Rif	Cav w/Spring	Springfield	MS	250	0.068	0.186	0.147
1	Indian w/Smo	Cav w/Spring	Springfield	MS	230	0.074	0.185	0.149
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	14	0.085	0.168	0.137
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1786	0.066	0.185	0.151
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	30	0.096	0.189	0.146
1	Indian w/Spr	Cav w/Spring	Springfield	MS	124	0.072	0.185	0.147
1	Indian w/Sha	Cav w/Spring	Springfield	MS	269	0.071	0.185	0.147
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	65	0.073	0.178	0.127
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	5	0.096	0.184	0.146
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	42	0.093	0.183	0.148
1	Indian w/Win	Cav w/Spring	Winchester .	TL	33	0.067	0.177	0.145
1	Indian w/Win	Cav w/Spring	Winchester .	KK	60	0.071	0.182	0.133
1	Indian w/Rif	Cav w/Spring	Springfield	TL	9	0.093	0.178	0.140
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	25	0.091	0.181	0.150
1	Indian w/Rif	Cav w/Spring	Springfield	KK	21	0.083	0.168	0.117
1	Indian w/Smo	Cav w/Spring	Springfield	TL	9	0.090	0.176	0.149
1	Indian w/Bow	Cav w/Spring	45CAL	MS	290	0.033	0.061	0.044
1	Indian w/Bow	Cav w/Spring	45CAL	KK	13	0.037	0.048	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	49	0.036	0.050	0.042
1	Indian w/Smo	Cav w/Spring	Springfield	KK	13	0.080	0.161	0.110
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	11	0.086	0.183	0.143
1	Indian w/Spr	Cav w/Spring	Springfield	TL	7	0.079	0.183	0.137
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	9	0.071	0.182	0.151
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	4	0.036	0.047	0.044
1	Indian w/Bow	Cav w/Spring	45CAL	TL	1	0.042	0.042	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	FP	2	0.040	0.047	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	1	0.050	0.050	0.050
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	9	0.105	0.173	0.138
1	Indian w/Sha	Cav w/Spring	Springfield	TL	5	0.127	0.178	0.159
1	Indian w/Sha	Cav w/Spring	Springfield	KK	25	0.083	0.165	0.117
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	2	0.116	0.145	0.131
1	Indian w/Spr	Cav w/Spring	Springfield	KK	3	0.090	0.137	0.109
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	2	0.091	0.097	0.094
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	2	0.146	0.158	0.152
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1416	0.035	0.347	0.108
2	Cav w/Spring	Indian w/Bow	Springfield	KK	534	0.037	0.339	0.104

2	Cav w/Spring	Indian w/Bow	Springfield	DUD	68	0.059	0.300	0.113
2	Cav w/Spring	Indian w/Bow	Springfield	TL	54	0.061	0.346	0.145
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	98	0.052	0.341	0.116
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	71	0.035	0.050	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	22	0.038	0.050	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	5	0.040	0.050	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	1	0.050	0.050	0.050
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	3	0.048	0.049	0.049
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	2	0.045	0.050	0.048
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	1	0.049	0.049	0.049
2	Cav w/Spring	Indian w/Hen	Springfield	MS	53	0.049	0.382	0.182
2	Cav w/Spring	Indian w/Sha	Springfield	MS	18	0.038	0.349	0.154
2	Cav w/Spring	Indian w/Rif	Springfield	MS	42	0.082	0.365	0.181
2	Cav w/Spring	Indian w/Win	Springfield	MS	43	0.045	0.352	0.174
2	Cav w/Spring	Indian w/Smo	Springfield	MS	53	0.046	0.375	0.182
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	3	0.172	0.188	0.181
2	Cav w/Spring	Indian w/Win	Springfield	DUD	3	0.045	0.219	0.152
2	Cav w/Spring	Indian w/Spr	Springfield	MS	5	0.134	0.332	0.219
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	2	0.120	0.124	0.122
2	Cav w/Spring	Indian w/Win	Springfield	KK	33	0.037	0.362	0.133
2	Cav w/Spring	Indian w/Hen	Springfield	KK	35	0.056	0.382	0.210
2	Cav w/Spring	Indian w/Smo	Springfield	KK	28	0.048	0.361	0.184
2	Cav w/Spring	Indian w/Win	Springfield	SUS	10	0.094	0.349	0.278
2	Cav w/Spring	Indian w/Sha	Springfield	KK	13	0.041	0.344	0.198
2	Cav w/Spring	Indian w/Rif	Springfield	KK	27	0.039	0.362	0.190
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	4	0.130	0.322	0.266
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.122	0.122	0.122
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	3	0.047	0.087	0.072
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	7	0.054	0.375	0.289
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	15	0.112	0.383	0.298
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	7	0.305	0.342	0.324
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	3	0.045	0.316	0.223
2	Cav w/Spring	Indian w/Spr	Springfield	KK	7	0.046	0.330	0.196
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	1	0.329	0.329	0.329
2	Cav w/Spring	Indian w/Rif	Springfield	TL	1	0.302	0.302	0.302
2	Cav w/Spring	Indian w/Win	Springfield	TL	1	0.338	0.338	0.338
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	1	0.028	0.028	0.028
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	1	0.041	0.041	0.041
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.041	0.041	0.041
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	1	0.049	0.049	0.049
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.049	0.049	0.049
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	1	0.039	0.039	0.039

Ambrose 3-10 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	643	0.077	0.216	0.150
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1133	0.069	0.186	0.145
1	Indian w/Smo	Cav w/Spring	Springfield	MS	146	0.083	0.211	0.149
1	Indian w/Sha	Cav w/Spring	Springfield	MS	189	0.079	0.188	0.144
1	Indian w/Smo	Cav w/Spring	Springfield	KK	14	0.088	0.152	0.118
1	Indian w/Rif	Cav w/Spring	Springfield	MS	195	0.077	0.185	0.143
1	Indian w/Win	Cav w/Spring	Winchester .	KK	100	0.075	0.176	0.120
1	Indian w/Spr	Cav w/Spring	Springfield	MS	78	0.083	0.215	0.150
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	49	0.087	0.171	0.130
1	Indian w/Rif	Cav w/Spring	Springfield	TL	6	0.105	0.184	0.151
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	26	0.086	0.184	0.145
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	26	0.120	0.183	0.157
1	Indian w/Sha	Cav w/Spring	Springfield	KK	15	0.088	0.163	0.118
1	Indian w/Smo	Cav w/Spring	Springfield	TL	4	0.136	0.162	0.150
1	Indian w/Win	Cav w/Spring	Winchester .	TL	31	0.076	0.180	0.138
1	Indian w/Bow	Cav w/Spring	45CAL	MS	375	0.027	0.059	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	86	0.027	0.058	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	KK	8	0.031	0.048	0.041
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	18	0.075	0.172	0.119
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	3	0.082	0.106	0.092
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	46	0.083	0.184	0.144
1	Indian w/Rif	Cav w/Spring	Springfield	KK	5	0.083	0.160	0.107
1	Indian w/Spr	Cav w/Spring	Springfield	TL	6	0.101	0.184	0.145
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	5	0.122	0.185	0.154
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	8	0.095	0.185	0.145
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	7	0.033	0.044	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	FP	2	0.032	0.039	0.036
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	1	0.044	0.044	0.044
1	Indian w/Sha	Cav w/Spring	Springfield	TL	3	0.089	0.185	0.143

1	Indian w/Spr	Cav w/Spring	Springfield	DUD	1	0.127	0.127	0.127
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	2	0.089	0.089	0.089
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	9	0.085	0.176	0.120
1	Indian w/Spr	Cav w/Spring	Springfield	KK	6	0.099	0.142	0.112
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	4	0.098	0.150	0.129
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	2	0.103	0.114	0.109
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	1	0.101	0.101	0.101
2	Cav w/Spring	Indian w/Bow	Springfield	MS	1265	0.039	0.381	0.107
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	60	0.052	0.372	0.113
2	Cav w/Spring	Indian w/Bow	Springfield	KK	526	0.043	0.364	0.106
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	99	0.042	0.372	0.127
2	Cav w/Spring	Indian w/Bow	Springfield	TL	73	0.050	0.375	0.156
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	81	0.035	0.051	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	5	0.043	0.047	0.045
2	Cav w/Spring	Indian w/Bow	Colt 1873	TL	5	0.039	0.048	0.043
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	29	0.035	0.050	0.042
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	3	0.047	0.049	0.048
2	Cav w/Spring	Indian w/Hen	Springfield	MS	40	0.072	0.372	0.205
2	Cav w/Spring	Indian w/Win	Springfield	KK	50	0.039	0.393	0.209
2	Cav w/Spring	Indian w/Win	Springfield	MS	42	0.043	0.391	0.162
2	Cav w/Spring	Indian w/Spr	Springfield	MS	16	0.089	0.354	0.164
2	Cav w/Spring	Indian w/Rif	Springfield	MS	43	0.088	0.395	0.221
2	Cav w/Spring	Indian w/Sha	Springfield	MS	12	0.096	0.377	0.188
2	Cav w/Spring	Indian w/Hen	Springfield	KK	34	0.048	0.375	0.218
2	Cav w/Spring	Indian w/Smo	Springfield	MS	32	0.058	0.388	0.218
2	Cav w/Spring	Indian w/Sha	Springfield	KK	14	0.038	0.352	0.175
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	13	0.051	0.352	0.253
2	Cav w/Spring	Indian w/Rif	Springfield	KK	36	0.044	0.335	0.187
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	7	0.093	0.404	0.301
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	3	0.063	0.337	0.184
2	Cav w/Spring	Indian w/Smo	Springfield	KK	35	0.046	0.359	0.180
2	Cav w/Spring	Indian w/Win	Springfield	SUS	15	0.041	0.371	0.236
2	Cav w/Spring	Indian w/Spr	Springfield	KK	8	0.049	0.333	0.180
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	4	0.070	0.359	0.215
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	18	0.065	0.415	0.298
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	2	0.094	0.351	0.222
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	2	0.109	0.407	0.258
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	10	0.047	0.362	0.273
2	Cav w/Spring	Indian w/Spr	Springfield	TL	1	0.331	0.331	0.331
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	2	0.067	0.323	0.195
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	1	0.036	0.036	0.036
2	Cav w/Spring	Indian w/Win	Springfield	DUD	1	0.045	0.045	0.045

2. Fox

Fox 3-1 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Sha	Cav w/Spring	Springfield	MS	444	0.054	0.185	0.128
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	10	0.068	0.161	0.114
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1673	0.065	0.194	0.143
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2461	0.080	0.193	0.134
1	Indian w/Spr	Cav w/Spring	Springfield	MS	224	0.065	0.194	0.131
1	Indian w/Rif	Cav w/Spring	Springfield	MS	455	0.034	0.185	0.130
1	Indian w/Smo	Cav w/Spring	Springfield	MS	371	0.052	0.187	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	71	0.081	0.181	0.124
1	Indian w/Rif	Cav w/Spring	Springfield	MOB	4	0.141	0.162	0.149
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	18	0.066	0.177	0.130
1	Indian w/Rif	Cav w/Spring	Springfield	FP	1	0.140	0.140	0.140
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	81	0.086	0.185	0.136
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	34	0.070	0.180	0.121
1	Indian w/Sha	Cav w/Spring	Springfield	TL	1	0.128	0.128	0.128
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	31	0.081	0.170	0.120
1	Indian w/Win	Cav w/Spring	Winchester .	KK	36	0.087	0.176	0.130
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	41	0.065	0.191	0.127
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	53	0.078	0.186	0.138
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	27	0.062	0.172	0.114
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	18	0.076	0.180	0.119
1	Indian w/Win	Cav w/Spring	Winchester .	TL	14	0.092	0.177	0.136
1	Indian w/Spr	Cav w/Spring	Springfield	TL	3	0.110	0.150	0.127
1	Indian w/Bow	Cav w/Spring	45CAL	MS	6040	0.003	0.051	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	252	0.006	0.050	0.036
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	60	0.009	0.046	0.032
1	Indian w/Bow	Cav w/Spring	45CAL	KK	65	0.011	0.048	0.030
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	18	0.053	0.182	0.121

1	Indian w/Sha	Cav w/Spring	Springfield	KK	10	0.080	0.162	0.124
1	Indian w/Rif	Cav w/Spring	Springfield	KK	15	0.038	0.153	0.093
1	Indian w/Win	Cav w/Spring	Winchester .	FP	9	0.093	0.132	0.116
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	17	0.079	0.168	0.128
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	7	0.082	0.167	0.118
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	21	0.059	0.177	0.122
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	2	0.097	0.124	0.110
1	Indian w/Spr	Cav w/Spring	Springfield	MOB	2	0.074	0.093	0.083
1	Indian w/Smo	Cav w/Spring	Springfield	FP	4	0.080	0.154	0.117
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	6	0.079	0.126	0.101
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	9	0.054	0.181	0.111
1	Indian w/Sha	Cav w/Spring	Springfield	FP	4	0.084	0.126	0.102
1	Indian w/Bow	Cav w/Spring	45CAL	TL	61	0.015	0.049	0.037
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	15	0.047	0.157	0.106
1	Indian w/Spr	Cav w/Spring	Springfield	KK	4	0.075	0.137	0.104
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	8	0.076	0.166	0.131
1	Indian w/Smo	Cav w/Spring	Springfield	KK	7	0.068	0.181	0.125
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	3	0.115	0.175	0.152
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	17	0.109	0.176	0.146
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	7	0.064	0.174	0.108
1	Indian w/Smo	Cav w/Spring	Springfield	MOB	2	0.081	0.111	0.096
1	Indian w/Spr	Cav w/Spring	Springfield	FP	2	0.081	0.176	0.129
1	Indian w/Smo	Cav w/Spring	Springfield	TL	6	0.044	0.188	0.152
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	3	0.014	0.039	0.030
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	9	0.091	0.161	0.138
1	Indian w/Rif	Cav w/Spring	Springfield	TL	5	0.123	0.178	0.157
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	1	0.169	0.169	0.169
2	Cav w/Spring	Indian w/Hen	Springfield	MS	26	0.052	0.212	0.128
2	Cav w/Spring	Indian w/Rif	Springfield	MS	63	0.048	0.144	0.113
2	Cav w/Spring	Indian w/Win	Springfield	SUS	5	0.051	0.109	0.084
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	4	0.062	0.096	0.076
2	Cav w/Spring	Indian w/Win	Springfield	MS	87	0.038	0.132	0.106
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	2	0.033	0.080	0.056
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	24	0.028	0.049	0.042
2	Cav w/Spring	Indian w/Rif	Springfield	MOB	2	0.049	0.055	0.052
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	2	0.036	0.046	0.041
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	2	0.039	0.040	0.040
2	Cav w/Spring	Indian w/Rif	Colt 1873	MFP	1	0.051	0.051	0.051
2	Cav w/Spring	Indian w/Spr	Colt 1873	MS	4	0.039	0.042	0.040
2	Cav w/Spring	Indian w/Smo	Springfield	MOB	1	0.064	0.064	0.064
2	Cav w/Spring	Indian w/Bow	Springfield	MS	418	0.012	0.251	0.117
2	Cav w/Spring	Indian w/Sha	Springfield	MS	29	0.066	0.128	0.108
2	Cav w/Spring	Indian w/Spr	Springfield	MS	10	0.101	0.185	0.135
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	1	0.117	0.117	0.117
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	3	0.090	0.128	0.113
2	Cav w/Spring	Indian w/Smo	Springfield	MS	30	0.037	0.137	0.105
2	Cav w/Spring	Indian w/Win	Springfield	KK	4	0.093	0.106	0.102
2	Cav w/Spring	Indian w/Bow	Springfield	KK	16	0.020	0.156	0.085
2	Cav w/Spring	Indian w/Win	Springfield	DUD	6	0.090	0.117	0.103
2	Cav w/Spring	Indian w/Rif	Springfield	MFP	1	0.112	0.112	0.112
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	17	0.086	0.122	0.110
2	Cav w/Spring	Indian w/Bow	Springfield	FP	3	0.096	0.107	0.102
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	22	0.027	0.178	0.105
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	4	0.083	0.123	0.106
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	3	0.028	0.186	0.100
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	1	0.107	0.107	0.107
2	Cav w/Spring	Indian w/Sha	Colt 1873	NE	3	0.042	0.049	0.046
2	Cav w/Spring	Indian w/Sha	Colt 1873	MS	5	0.027	0.049	0.036
2	Cav w/Spring	Indian w/Sha	Colt 1873	MOB	1	0.040	0.040	0.040
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	2	0.025	0.040	0.033
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	2	0.047	0.048	0.048
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	1	0.048	0.048	0.048
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	4	0.063	0.182	0.110
2	Cav w/Spring	Indian w/Win	Springfield	MFP	1	0.071	0.071	0.071
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	2	0.069	0.120	0.094
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	3	0.018	0.048	0.036
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	13	0.018	0.049	0.036
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	5	0.018	0.044	0.035
2	Cav w/Spring	Indian w/Win	Colt 1873	MFP	2	0.025	0.049	0.037
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.046	0.046	0.046
2	Cav w/Spring	Indian w/Smo	Colt 1873	MFP	1	0.012	0.012	0.012
2	Cav w/Spring	Indian w/Hen	Springfield	KK	3	0.036	0.060	0.052
2	Cav w/Spring	Indian w/Rif	Springfield	FP	1	0.084	0.084	0.084
2	Cav w/Spring	Indian w/Smo	Springfield	KK	2	0.031	0.048	0.040
2	Cav w/Spring	Indian w/Rif	Springfield	KK	2	0.021	0.071	0.046
2	Cav w/Spring	Indian w/Sha	Springfield	KK	2	0.022	0.058	0.040
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	1	0.046	0.046	0.046
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	2	0.082	0.087	0.085

Fox 3-2 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Spr	Cav w/Spring	Springfield	MS	189	0.079	0.191	0.132
1	Indian w/Sha	Cav w/Spring	Springfield	MS	389	0.078	0.190	0.128
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2071	0.075	0.192	0.136
1	Indian w/Rif	Cav w/Spring	Springfield	MS	388	0.072	0.188	0.131
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1336	0.070	0.191	0.140
1	Indian w/Smo	Cav w/Spring	Springfield	MS	328	0.074	0.186	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	83	0.090	0.185	0.132
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	31	0.076	0.181	0.120
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	19	0.071	0.170	0.112
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	23	0.085	0.179	0.134
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	75	0.080	0.181	0.131
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	7	0.101	0.165	0.132
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	42	0.078	0.184	0.150
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	5	0.084	0.155	0.101
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	38	0.076	0.178	0.125
1	Indian w/Sha	Cav w/Spring	Springfield	TL	3	0.092	0.148	0.125
1	Indian w/Win	Cav w/Spring	Winchester .	KK	45	0.086	0.178	0.129
1	Indian w/Win	Cav w/Spring	Winchester .	FP	5	0.105	0.181	0.147
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	19	0.064	0.182	0.123
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	6	0.098	0.172	0.138
1	Indian w/Bow	Cav w/Spring	45CAL	MS	5357	0.004	0.050	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	206	0.004	0.050	0.036
1	Indian w/Bow	Cav w/Spring	45CAL	KK	49	0.007	0.050	0.032
1	Indian w/Bow	Cav w/Spring	45CAL	TL	61	0.013	0.050	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	62	0.007	0.048	0.029
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	11	0.081	0.172	0.115
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	10	0.108	0.179	0.145
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	16	0.081	0.167	0.117
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	15	0.081	0.178	0.131
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	12	0.078	0.174	0.136
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	8	0.082	0.176	0.130
1	Indian w/Rif	Cav w/Spring	Springfield	KK	7	0.065	0.142	0.097
1	Indian w/Sha	Cav w/Spring	Springfield	FP	2	0.097	0.140	0.119
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	2	0.119	0.149	0.134
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	9	0.086	0.162	0.119
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	6	0.080	0.171	0.130
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	7	0.079	0.173	0.134
1	Indian w/Sha	Cav w/Spring	Springfield	KK	11	0.096	0.170	0.136
1	Indian w/Win	Cav w/Spring	Winchester .	TL	15	0.114	0.178	0.150
1	Indian w/Smo	Cav w/Spring	Springfield	MOB	1	0.079	0.079	0.079
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	17	0.091	0.180	0.144
1	Indian w/Spr	Cav w/Spring	Springfield	MOB	1	0.074	0.074	0.074
1	Indian w/Spr	Cav w/Spring	Springfield	TL	4	0.092	0.157	0.132
1	Indian w/Smo	Cav w/Spring	Springfield	KK	14	0.082	0.163	0.120
1	Indian w/Rif	Cav w/Spring	Springfield	MOB	3	0.093	0.136	0.108
1	Indian w/Spr	Cav w/Spring	Springfield	KK	4	0.093	0.139	0.119
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	3	0.080	0.144	0.103
1	Indian w/Smo	Cav w/Spring	Springfield	FP	2	0.120	0.173	0.146
1	Indian w/Rif	Cav w/Spring	Springfield	FP	1	0.162	0.162	0.162
1	Indian w/Rif	Cav w/Spring	Springfield	TL	6	0.081	0.184	0.151
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	5	0.090	0.170	0.135
1	Indian w/Smo	Cav w/Spring	Springfield	TL	7	0.085	0.183	0.138
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	2	0.025	0.033	0.029
2	Cav w/Spring	Indian w/Hen	Springfield	MS	37	0.012	0.274	0.105
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	10	0.018	0.188	0.075
2	Cav w/Spring	Indian w/Win	Springfield	MS	101	0.020	0.215	0.109
2	Cav w/Spring	Indian w/Smo	Springfield	MS	66	0.022	0.276	0.104
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	19	0.015	0.048	0.035
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	3	0.038	0.048	0.043
2	Cav w/Spring	Indian w/Sha	Springfield	MS	35	0.046	0.160	0.102
2	Cav w/Spring	Indian w/Rif	Springfield	KK	4	0.046	0.279	0.107
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	12	0.013	0.041	0.023
2	Cav w/Spring	Indian w/Hen	Colt 1873	NE	3	0.030	0.043	0.035
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	2	0.033	0.043	0.038
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	15	0.020	0.049	0.041
2	Cav w/Spring	Indian w/Bow	Springfield	MS	511	0.004	0.281	0.115
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	18	0.004	0.191	0.068
2	Cav w/Spring	Indian w/Bow	Springfield	KK	33	0.012	0.272	0.077
2	Cav w/Spring	Indian w/Win	Springfield	SUS	15	0.008	0.118	0.067
2	Cav w/Spring	Indian w/Rif	Springfield	MS	70	0.023	0.278	0.106
2	Cav w/Spring	Indian w/Spr	Springfield	MS	12	0.021	0.254	0.110
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	12	0.022	0.279	0.108
2	Cav w/Spring	Indian w/Win	Springfield	MOB	2	0.005	0.116	0.060
2	Cav w/Spring	Indian w/Win	Springfield	DUD	6	0.041	0.119	0.096

2	Cav w/Spring	Indian w/Smo	Springfield	DUD	6	0.024	0.133	0.067
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	5	0.059	0.119	0.087
2	Cav w/Spring	Indian w/Win	Springfield	FP	3	0.080	0.159	0.115
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	7	0.028	0.154	0.060
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	50	0.011	0.265	0.080
2	Cav w/Spring	Indian w/Bow	Springfield	FP	6	0.005	0.121	0.060
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	13	0.025	0.128	0.061
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	14	0.054	0.216	0.112
2	Cav w/Spring	Indian w/Sha	Springfield	KK	6	0.006	0.094	0.055
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	7	0.032	0.094	0.072
2	Cav w/Spring	Indian w/Hen	Springfield	KK	7	0.056	0.218	0.116
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	7	0.007	0.047	0.021
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	7	0.002	0.040	0.022
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	9	0.020	0.048	0.032
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	4	0.011	0.033	0.023
2	Cav w/Spring	Indian w/Smo	Springfield	KK	6	0.027	0.176	0.065
2	Cav w/Spring	Indian w/Spr	Springfield	MFP	4	0.027	0.062	0.044
2	Cav w/Spring	Indian w/Win	Springfield	MFP	5	0.018	0.113	0.064
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	2	0.024	0.045	0.035
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	6	0.004	0.049	0.032
2	Cav w/Spring	Indian w/Sha	Colt 1873	MFP	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Win	Colt 1873	MFP	3	0.007	0.020	0.015
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	3	0.010	0.077	0.043
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	2	0.011	0.013	0.012
2	Cav w/Spring	Indian w/Rif	Colt 1873	FP	1	0.040	0.040	0.040
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	3	0.019	0.029	0.024
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	2	0.014	0.025	0.020
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	2	0.010	0.032	0.021
2	Cav w/Spring	Indian w/Win	Springfield	KK	7	0.025	0.180	0.092
2	Cav w/Spring	Indian w/Smo	Colt 1873	MOB	1	0.043	0.043	0.043
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Hen	Springfield	FP	2	0.064	0.100	0.082
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	8	0.012	0.029	0.022
2	Cav w/Spring	Indian w/Smo	Colt 1873	MFP	1	0.048	0.048	0.048
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.055	0.055	0.055
2	Cav w/Spring	Indian w/Sha	Colt 1873	NE	2	0.032	0.038	0.035
2	Cav w/Spring	Indian w/Sha	Colt 1873	MS	3	0.009	0.039	0.029
2	Cav w/Spring	Indian w/Rif	Colt 1873	MOB	1	0.006	0.006	0.006
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	1	0.084	0.084	0.084
2	Cav w/Spring	Indian w/Sha	Springfield	MOB	1	0.015	0.015	0.015
2	Cav w/Spring	Indian w/Sha	Colt 1873	KK	1	0.009	0.009	0.009
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	2	0.012	0.016	0.014
2	Cav w/Spring	Indian w/Win	Colt 1873	MOB	1	0.036	0.036	0.036
2	Cav w/Spring	Indian w/Rif	Springfield	MOB	1	0.034	0.034	0.034
2	Cav w/Spring	Indian w/Rif	Springfield	MFP	2	0.074	0.128	0.101
2	Cav w/Spring	Indian w/Smo	Springfield	FP	1	0.036	0.036	0.036
2	Cav w/Spring	Indian w/Spr	Springfield	KK	2	0.046	0.053	0.049
2	Cav w/Spring	Indian w/Hen	Colt 1873	MFP	1	0.030	0.030	0.030
2	Cav w/Spring	Indian w/Rif	Springfield	FP	1	0.079	0.079	0.079
2	Cav w/Spring	Indian w/Sha	Springfield	MFP	1	0.164	0.164	0.164
2	Cav w/Spring	Indian w/Hen	Springfield	MOB	1	0.196	0.196	0.196

Fox 3-3 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2562	0.077	0.185	0.135
1	Indian w/Spr	Cav w/Spring	Springfield	MS	222	0.071	0.196	0.136
1	Indian w/Smo	Cav w/Spring	Springfield	MS	383	0.065	0.193	0.136
1	Indian w/Rif	Cav w/Spring	Springfield	MS	435	0.058	0.185	0.136
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1698	0.060	0.199	0.140
1	Indian w/Rif	Cav w/Spring	Springfield	KK	11	0.065	0.180	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	TL	18	0.102	0.178	0.139
1	Indian w/Win	Cav w/Spring	Winchester .	FP	10	0.095	0.170	0.128
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	49	0.081	0.184	0.140
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	80	0.084	0.184	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	KK	41	0.077	0.161	0.123
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	31	0.082	0.179	0.134
1	Indian w/Sha	Cav w/Spring	Springfield	MS	464	0.060	0.185	0.129
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	37	0.072	0.171	0.129
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	21	0.075	0.172	0.127
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	32	0.079	0.196	0.120
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	15	0.105	0.183	0.153
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	17	0.100	0.168	0.145
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	3	0.092	0.152	0.123
1	Indian w/Rif	Cav w/Spring	Springfield	FP	3	0.139	0.161	0.150
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	75	0.077	0.179	0.127

1	Indian w/Sha	Cav w/Spring	Springfield	DUD	14	0.084	0.184	0.132
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	11	0.081	0.183	0.127
1	Indian w/Smo	Cav w/Spring	Springfield	KK	13	0.066	0.185	0.118
1	Indian w/Sha	Cav w/Spring	Springfield	TL	5	0.102	0.176	0.138
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	9	0.077	0.180	0.135
1	Indian w/Bow	Cav w/Spring	45CAL	MS	5114	0.004	0.051	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	208	0.004	0.050	0.034
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	36	0.009	0.044	0.027
1	Indian w/Bow	Cav w/Spring	45CAL	KK	86	0.008	0.049	0.029
1	Indian w/Bow	Cav w/Spring	45CAL	TL	70	0.013	0.049	0.038
1	Indian w/Sha	Cav w/Spring	Springfield	KK	8	0.065	0.160	0.113
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	22	0.064	0.151	0.102
1	Indian w/Spr	Cav w/Spring	Springfield	KK	7	0.074	0.162	0.103
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	17	0.072	0.178	0.134
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	13	0.094	0.175	0.125
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	7	0.083	0.174	0.140
1	Indian w/Rif	Cav w/Spring	Springfield	TL	8	0.074	0.179	0.139
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	6	0.086	0.153	0.125
1	Indian w/Spr	Cav w/Spring	Springfield	FP	3	0.114	0.140	0.129
1	Indian w/Sha	Cav w/Spring	Springfield	FP	2	0.071	0.078	0.075
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	4	0.119	0.163	0.133
1	Indian w/Spr	Cav w/Spring	Springfield	TL	4	0.111	0.181	0.136
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	3	0.061	0.094	0.078
1	Indian w/Smo	Cav w/Spring	Springfield	MOB	1	0.080	0.080	0.080
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	4	0.028	0.043	0.034
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	6	0.083	0.175	0.118
1	Indian w/Rif	Cav w/Spring	Springfield	MOB	3	0.079	0.168	0.133
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	3	0.121	0.148	0.138
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	4	0.099	0.158	0.135
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	2	0.112	0.142	0.127
1	Indian w/Smo	Cav w/Spring	Springfield	TL	1	0.102	0.102	0.102
2	Cav w/Spring	Indian w/Win	Springfield	MS	88	0.034	0.138	0.107
2	Cav w/Spring	Indian w/Bow	Springfield	MS	329	0.032	0.197	0.115
2	Cav w/Spring	Indian w/Rif	Springfield	MS	46	0.083	0.163	0.111
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	2	0.110	0.124	0.117
2	Cav w/Spring	Indian w/Sha	Springfield	MS	26	0.089	0.130	0.110
2	Cav w/Spring	Indian w/Win	Springfield	SUS	1	0.109	0.109	0.109
2	Cav w/Spring	Indian w/Win	Springfield	MOB	1	0.100	0.100	0.100
2	Cav w/Spring	Indian w/Smo	Springfield	MS	29	0.031	0.149	0.107
2	Cav w/Spring	Indian w/Win	Springfield	DUD	5	0.099	0.126	0.109
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	9	0.040	0.171	0.115
2	Cav w/Spring	Indian w/Rif	Springfield	FP	1	0.107	0.107	0.107
2	Cav w/Spring	Indian w/Win	Springfield	KK	4	0.024	0.113	0.069
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	18	0.009	0.172	0.090
2	Cav w/Spring	Indian w/Spr	Springfield	MS	7	0.080	0.135	0.105
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	3	0.108	0.141	0.122
2	Cav w/Spring	Indian w/Hen	Springfield	MS	16	0.020	0.219	0.105
2	Cav w/Spring	Indian w/Rif	Springfield	MFP	1	0.096	0.096	0.096
2	Cav w/Spring	Indian w/Win	Springfield	MFP	1	0.097	0.097	0.097
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	2	0.118	0.119	0.118
2	Cav w/Spring	Indian w/Hen	Springfield	FP	1	0.078	0.078	0.078
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	1	0.086	0.086	0.086
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	1	0.040	0.040	0.040
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	6	0.025	0.116	0.072
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	4	0.026	0.041	0.035
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	7	0.026	0.042	0.037
2	Cav w/Spring	Indian w/Win	Colt 1873	MFP	2	0.016	0.042	0.029
2	Cav w/Spring	Indian w/Sha	Colt 1873	MS	3	0.047	0.050	0.049
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	2	0.020	0.053	0.036
2	Cav w/Spring	Indian w/Sha	Colt 1873	MFP	1	0.050	0.050	0.050
2	Cav w/Spring	Indian w/Rif	Springfield	KK	2	0.038	0.172	0.105
2	Cav w/Spring	Indian w/Bow	Springfield	KK	7	0.041	0.106	0.082
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	2	0.040	0.040	0.040
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	2	0.039	0.039	0.039
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	1	0.002	0.002	0.002
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	2	0.027	0.049	0.038
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	2	0.056	0.175	0.115
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	1	0.037	0.037	0.037
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.022	0.022	0.022
2	Cav w/Spring	Indian w/Hen	Springfield	KK	1	0.043	0.043	0.043
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	3	0.059	0.198	0.144
2	Cav w/Spring	Indian w/Smo	Springfield	MOB	1	0.183	0.183	0.183
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	1	0.200	0.200	0.200

Fox 3-4 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1575	0.059	0.200	0.146
1	Indian w/Smo	Cav w/Spring	Springfield	MS	353	0.044	0.199	0.137
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	23	0.074	0.186	0.129
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2221	0.060	0.190	0.140
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	70	0.086	0.187	0.139
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	56	0.081	0.186	0.142
1	Indian w/Win	Cav w/Spring	Winchester .	KK	49	0.085	0.174	0.127
1	Indian w/Smo	Cav w/Spring	Springfield	TL	6	0.066	0.169	0.134
1	Indian w/Rif	Cav w/Spring	Springfield	MS	432	0.032	0.196	0.134
1	Indian w/Sha	Cav w/Spring	Springfield	FP	4	0.093	0.132	0.113
1	Indian w/Spr	Cav w/Spring	Springfield	MS	193	0.064	0.197	0.138
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	34	0.077	0.182	0.129
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	21	0.100	0.179	0.134
1	Indian w/Spr	Cav w/Spring	Springfield	TL	7	0.067	0.191	0.120
1	Indian w/Win	Cav w/Spring	Winchester .	TL	25	0.075	0.180	0.139
1	Indian w/Sha	Cav w/Spring	Springfield	MS	360	0.060	0.191	0.134
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	13	0.065	0.179	0.125
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	63	0.085	0.178	0.139
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	8	0.069	0.174	0.128
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	35	0.073	0.175	0.122
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	15	0.074	0.183	0.130
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	21	0.058	0.159	0.107
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	16	0.100	0.182	0.151
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	23	0.065	0.199	0.119
1	Indian w/Bow	Cav w/Spring	45CAL	MS	5474	0.001	0.051	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	251	0.001	0.050	0.034
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	60	0.008	0.048	0.029
1	Indian w/Bow	Cav w/Spring	45CAL	KK	52	0.011	0.049	0.032
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	12	0.065	0.189	0.113
1	Indian w/Win	Cav w/Spring	Winchester .	FP	4	0.085	0.177	0.120
1	Indian w/Sha	Cav w/Spring	Springfield	KK	15	0.067	0.174	0.122
1	Indian w/Rif	Cav w/Spring	Springfield	KK	7	0.039	0.171	0.104
1	Indian w/Rif	Cav w/Spring	Springfield	TL	6	0.037	0.180	0.114
1	Indian w/Smo	Cav w/Spring	Springfield	MOB	2	0.091	0.127	0.109
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	4	0.069	0.131	0.089
1	Indian w/Smo	Cav w/Spring	Springfield	KK	7	0.057	0.162	0.123
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	8	0.079	0.190	0.135
1	Indian w/Spr	Cav w/Spring	Springfield	MOB	2	0.083	0.127	0.105
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	8	0.077	0.146	0.107
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	17	0.069	0.178	0.122
1	Indian w/Sha	Cav w/Spring	Springfield	TL	5	0.081	0.163	0.132
1	Indian w/Bow	Cav w/Spring	45CAL	TL	39	0.014	0.050	0.037
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	6	0.062	0.140	0.108
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	7	0.076	0.174	0.127
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	6	0.071	0.161	0.116
1	Indian w/Spr	Cav w/Spring	Springfield	KK	6	0.068	0.181	0.118
1	Indian w/Rif	Cav w/Spring	Springfield	MOB	1	0.083	0.083	0.083
1	Indian w/Smo	Cav w/Spring	Springfield	FP	4	0.064	0.186	0.114
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	3	0.094	0.168	0.122
1	Indian w/Rif	Cav w/Spring	Springfield	FP	3	0.139	0.159	0.151
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	2	0.122	0.136	0.129
1	Indian w/Spr	Cav w/Spring	Springfield	FP	1	0.097	0.097	0.097
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	5	0.070	0.181	0.130
2	Cav w/Spring	Indian w/Bow	Springfield	MS	402	0.005	0.285	0.118
2	Cav w/Spring	Indian w/Win	Springfield	MS	95	0.009	0.283	0.114
2	Cav w/Spring	Indian w/Rif	Springfield	MS	62	0.030	0.274	0.114
2	Cav w/Spring	Indian w/Sha	Springfield	MS	26	0.039	0.278	0.116
2	Cav w/Spring	Indian w/Win	Springfield	DUD	4	0.023	0.210	0.100
2	Cav w/Spring	Indian w/Spr	Springfield	MS	20	0.021	0.209	0.109
2	Cav w/Spring	Indian w/Win	Springfield	MFP	7	0.014	0.284	0.136
2	Cav w/Spring	Indian w/Smo	Springfield	MS	47	0.029	0.269	0.107
2	Cav w/Spring	Indian w/Sha	Springfield	KK	3	0.077	0.116	0.099
2	Cav w/Spring	Indian w/Hen	Springfield	MS	34	0.027	0.269	0.116
2	Cav w/Spring	Indian w/Win	Springfield	SUS	8	0.008	0.282	0.082
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	17	0.009	0.273	0.097
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	2	0.039	0.096	0.067
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.105	0.105	0.105
2	Cav w/Spring	Indian w/Win	Springfield	FP	3	0.038	0.280	0.139
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	36	0.017	0.279	0.142
2	Cav w/Spring	Indian w/Win	Springfield	KK	2	0.006	0.112	0.059
2	Cav w/Spring	Indian w/Bow	Springfield	KK	42	0.012	0.275	0.118
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	19	0.069	0.269	0.135
2	Cav w/Spring	Indian w/Smo	Springfield	KK	5	0.055	0.270	0.128
2	Cav w/Spring	Indian w/Spr	Springfield	MOB	1	0.057	0.057	0.057
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	56	0.012	0.277	0.129
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	6	0.021	0.047	0.033
2	Cav w/Spring	Indian w/Win	Colt 1873	MOB	3	0.035	0.048	0.040

2	Cav w/Spring	Indian w/Spr	Colt 1873	MS	2	0.022	0.026	0.024
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	2	0.026	0.032	0.029
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	14	0.019	0.272	0.105
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	9	0.019	0.265	0.096
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	5	0.026	0.039	0.036
2	Cav w/Spring	Indian w/Smo	Colt 1873	MFP	1	0.026	0.026	0.026
2	Cav w/Spring	Indian w/Hen	Colt 1873	NE	1	0.027	0.027	0.027
2	Cav w/Spring	Indian w/Sha	Colt 1873	NE	3	0.033	0.040	0.036
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	1	0.027	0.027	0.027
2	Cav w/Spring	Indian w/Hen	Colt 1873	MFP	1	0.020	0.020	0.020
2	Cav w/Spring	Indian w/Sha	Colt 1873	MS	3	0.026	0.026	0.026
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	10	0.019	0.039	0.027
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	3	0.021	0.038	0.027
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	19	0.010	0.047	0.036
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	4	0.031	0.047	0.039
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	29	0.020	0.051	0.037
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.017	0.017	0.017
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	2	0.042	0.045	0.044
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	3	0.038	0.045	0.042
2	Cav w/Spring	Indian w/Rif	Colt 1873	FP	1	0.045	0.045	0.045
2	Cav w/Spring	Indian w/Bow	Springfield	FP	9	0.043	0.270	0.116
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	2	0.024	0.040	0.032
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	4	0.021	0.262	0.105
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	4	0.014	0.043	0.029
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	1	0.062	0.062	0.062
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	2	0.006	0.027	0.017
2	Cav w/Spring	Indian w/Rif	Colt 1873	MFP	1	0.018	0.018	0.018
2	Cav w/Spring	Indian w/Hen	Colt 1873	MOB	1	0.017	0.017	0.017
2	Cav w/Spring	Indian w/Win	Colt 1873	FP	1	0.021	0.021	0.021
2	Cav w/Spring	Indian w/Hen	Springfield	KK	6	0.043	0.092	0.062
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	4	0.014	0.187	0.088
2	Cav w/Spring	Indian w/Hen	Springfield	MOB	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	3	0.050	0.110	0.072
2	Cav w/Spring	Indian w/Win	Springfield	MOB	3	0.033	0.282	0.118
2	Cav w/Spring	Indian w/Rif	Springfield	KK	5	0.051	0.277	0.109
2	Cav w/Spring	Indian w/Hen	Springfield	FP	1	0.067	0.067	0.067
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	2	0.057	0.199	0.128
2	Cav w/Spring	Indian w/Spr	Springfield	MFP	1	0.134	0.134	0.134
2	Cav w/Spring	Indian w/Sha	Springfield	MFP	1	0.013	0.013	0.013
2	Cav w/Spring	Indian w/Sha	Springfield	MOB	2	0.034	0.041	0.038
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	3	0.029	0.262	0.146
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	1	0.024	0.024	0.024
2	Cav w/Spring	Indian w/Sha	Colt 1873	MFP	1	0.024	0.024	0.024
2	Cav w/Spring	Indian w/Spr	Springfield	KK	4	0.022	0.262	0.148
2	Cav w/Spring	Indian w/Rif	Springfield	MFP	2	0.084	0.112	0.098
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	1	0.021	0.021	0.021
2	Cav w/Spring	Indian w/Rif	Springfield	FP	2	0.269	0.274	0.271

Fox 3-5 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2495	0.070	0.185	0.138
1	Indian w/Spr	Cav w/Spring	Springfield	MS	195	0.054	0.185	0.135
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1507	0.066	0.191	0.145
1	Indian w/Rif	Cav w/Spring	Springfield	MS	421	0.060	0.186	0.137
1	Indian w/Sha	Cav w/Spring	Springfield	MS	412	0.057	0.185	0.131
1	Indian w/Smo	Cav w/Spring	Springfield	MS	344	0.061	0.185	0.140
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	16	0.092	0.173	0.145
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	72	0.088	0.179	0.137
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	17	0.073	0.168	0.128
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	26	0.068	0.189	0.117
1	Indian w/Smo	Cav w/Spring	Springfield	TL	11	0.089	0.183	0.157
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	91	0.091	0.185	0.137
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	14	0.088	0.166	0.117
1	Indian w/Win	Cav w/Spring	Winchester .	KK	47	0.087	0.174	0.133
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	17	0.077	0.174	0.130
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	56	0.077	0.184	0.141
1	Indian w/Win	Cav w/Spring	Winchester .	FP	10	0.100	0.166	0.128
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	17	0.091	0.185	0.143
1	Indian w/Spr	Cav w/Spring	Springfield	KK	6	0.080	0.139	0.104
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	2	0.105	0.127	0.116
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	54	0.074	0.180	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	29	0.071	0.176	0.122
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	12	0.071	0.174	0.127
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	9	0.104	0.184	0.149
1	Indian w/Smo	Cav w/Spring	Springfield	FP	3	0.121	0.166	0.138

1	Indian w/Rif	Cav w/Spring	Springfield	SUS	25	0.062	0.170	0.120
1	Indian w/Rif	Cav w/Spring	Springfield	KK	19	0.059	0.163	0.114
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	19	0.081	0.185	0.147
1	Indian w/Spr	Cav w/Spring	Springfield	TL	10	0.083	0.177	0.136
1	Indian w/Bow	Cav w/Spring	45CAL	MS	5273	0.004	0.051	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	KK	64	0.008	0.047	0.030
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	215	0.008	0.050	0.035
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	54	0.011	0.049	0.030
1	Indian w/Bow	Cav w/Spring	45CAL	TL	46	0.012	0.050	0.037
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	13	0.089	0.168	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	TL	16	0.111	0.185	0.148
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	4	0.106	0.160	0.128
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	5	0.085	0.149	0.120
1	Indian w/Sha	Cav w/Spring	Springfield	KK	12	0.063	0.163	0.121
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	10	0.068	0.145	0.110
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	8	0.066	0.150	0.100
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	5	0.099	0.178	0.156
1	Indian w/Smo	Cav w/Spring	Springfield	KK	8	0.081	0.172	0.120
1	Indian w/Sha	Cav w/Spring	Springfield	TL	3	0.101	0.184	0.153
1	Indian w/Sha	Cav w/Spring	Springfield	FP	2	0.084	0.085	0.084
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	3	0.081	0.171	0.117
1	Indian w/Smo	Cav w/Spring	Springfield	MOB	3	0.138	0.165	0.147
1	Indian w/Rif	Cav w/Spring	Springfield	TL	6	0.135	0.169	0.148
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	4	0.099	0.150	0.126
1	Indian w/Spr	Cav w/Spring	Springfield	FP	1	0.096	0.096	0.096
2	Cav w/Spring	Indian w/Rif	Springfield	MS	40	0.082	0.195	0.121
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	3	0.082	0.146	0.117
2	Cav w/Spring	Indian w/Hen	Springfield	MS	19	0.035	0.210	0.116
2	Cav w/Spring	Indian w/Smo	Springfield	MS	25	0.019	0.199	0.124
2	Cav w/Spring	Indian w/Win	Springfield	MS	76	0.009	0.206	0.112
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	7	0.031	0.049	0.042
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	2	0.036	0.045	0.041
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	5	0.031	0.045	0.039
2	Cav w/Spring	Indian w/Bow	Springfield	MS	305	0.033	0.183	0.114
2	Cav w/Spring	Indian w/Sha	Springfield	MS	11	0.094	0.152	0.119
2	Cav w/Spring	Indian w/Rif	Springfield	KK	2	0.107	0.114	0.110
2	Cav w/Spring	Indian w/Win	Springfield	DUD	3	0.103	0.131	0.115
2	Cav w/Spring	Indian w/Win	Springfield	KK	2	0.110	0.115	0.113
2	Cav w/Spring	Indian w/Smo	Springfield	KK	2	0.040	0.090	0.065
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	2	0.117	0.120	0.119
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	2	0.104	0.140	0.122
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	69	0.035	0.186	0.112
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	16	0.010	0.160	0.113
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	1	0.108	0.108	0.108
2	Cav w/Spring	Indian w/Sha	Springfield	KK	3	0.016	0.141	0.090
2	Cav w/Spring	Indian w/Bow	Springfield	KK	37	0.037	0.220	0.113
2	Cav w/Spring	Indian w/Spr	Springfield	MS	2	0.137	0.198	0.167
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	2	0.047	0.105	0.076
2	Cav w/Spring	Indian w/Bow	Springfield	FP	5	0.057	0.137	0.105
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	1	0.033	0.033	0.033
2	Cav w/Spring	Indian w/Sha	Springfield	MFP	1	0.091	0.091	0.091
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	8	0.022	0.050	0.042
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	1	0.022	0.022	0.022
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	21	0.024	0.138	0.111
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	1	0.052	0.052	0.052
2	Cav w/Spring	Indian w/Hen	Springfield	KK	2	0.040	0.046	0.043
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.182	0.182	0.182
2	Cav w/Spring	Indian w/Hen	Springfield	MOB	1	0.203	0.203	0.203
2	Cav w/Spring	Indian w/Win	Springfield	SUS	4	0.123	0.130	0.128
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	10	0.112	0.136	0.124
2	Cav w/Spring	Indian w/Win	Springfield	FP	1	0.134	0.134	0.134
2	Cav w/Spring	Indian w/Win	Springfield	MFP	2	0.136	0.137	0.137
2	Cav w/Spring	Indian w/Win	Springfield	MOB	1	0.130	0.130	0.130
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	2	0.138	0.139	0.138
2	Cav w/Spring	Indian w/Rif	Springfield	MFP	1	0.144	0.144	0.144

Fox 3-6 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Sha	Cav w/Spring	Springfield	MS	450	0.044	0.276	0.139
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1551	0.066	0.198	0.144
1	Indian w/Smo	Cav w/Spring	Springfield	MS	351	0.055	0.286	0.140
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	17	0.075	0.166	0.105
1	Indian w/Spr	Cav w/Spring	Springfield	MS	200	0.056	0.185	0.136
1	Indian w/Rif	Cav w/Spring	Springfield	MS	438	0.047	0.281	0.138
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	91	0.081	0.180	0.134

1	Indian w/Win	Cav w/Spring	Winchester .	MS	2780	0.061	0.185	0.142
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	99	0.085	0.185	0.140
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	32	0.067	0.182	0.119
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	15	0.104	0.177	0.145
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	30	0.094	0.174	0.136
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	18	0.089	0.185	0.139
1	Indian w/Win	Cav w/Spring	Winchester .	FP	14	0.086	0.176	0.127
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	21	0.057	0.175	0.120
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	50	0.077	0.179	0.118
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	50	0.080	0.183	0.147
1	Indian w/Win	Cav w/Spring	Winchester .	KK	49	0.086	0.182	0.130
1	Indian w/Win	Cav w/Spring	Winchester .	TL	19	0.100	0.184	0.147
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	6	0.076	0.138	0.114
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	5	0.095	0.149	0.125
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	16	0.075	0.173	0.128
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	5	0.087	0.167	0.126
1	Indian w/Sha	Cav w/Spring	Springfield	KK	14	0.051	0.169	0.104
1	Indian w/Smo	Cav w/Spring	Springfield	TL	12	0.070	0.179	0.125
1	Indian w/Sha	Cav w/Spring	Springfield	TL	5	0.071	0.132	0.104
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	18	0.100	0.183	0.134
1	Indian w/Spr	Cav w/Spring	Springfield	TL	6	0.062	0.142	0.104
1	Indian w/Smo	Cav w/Spring	Springfield	KK	7	0.058	0.167	0.115
1	Indian w/Bow	Cav w/Spring	45CAL	MS	6498	0.005	0.051	0.040
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	268	0.007	0.051	0.037
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	81	0.006	0.051	0.034
1	Indian w/Bow	Cav w/Spring	45CAL	KK	68	0.008	0.050	0.032
1	Indian w/Bow	Cav w/Spring	45CAL	TL	51	0.023	0.050	0.040
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	10	0.112	0.176	0.145
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	2	0.110	0.118	0.114
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	3	0.108	0.183	0.137
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	7	0.083	0.134	0.107
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	2	0.102	0.147	0.124
1	Indian w/Rif	Cav w/Spring	Springfield	TL	2	0.092	0.140	0.116
1	Indian w/Spr	Cav w/Spring	Springfield	MOB	2	0.083	0.175	0.129
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	14	0.075	0.175	0.134
1	Indian w/Spr	Cav w/Spring	Springfield	KK	6	0.086	0.150	0.120
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	7	0.075	0.155	0.115
1	Indian w/Rif	Cav w/Spring	Springfield	FP	2	0.061	0.106	0.084
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	9	0.075	0.183	0.129
1	Indian w/Rif	Cav w/Spring	Springfield	KK	12	0.078	0.163	0.114
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	5	0.011	0.042	0.027
1	Indian w/Sha	Cav w/Spring	Springfield	FP	1	0.072	0.072	0.072
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	5	0.052	0.168	0.124
1	Indian w/Rif	Cav w/Spring	Springfield	MOB	1	0.149	0.149	0.149
1	Indian w/Spr	Cav w/Spring	Springfield	FP	1	0.119	0.119	0.119
1	Indian w/Smo	Cav w/Spring	Springfield	FP	1	0.119	0.119	0.119
2	Cav w/Spring	Indian w/Hen	Springfield	MS	24	0.056	0.212	0.125
2	Cav w/Spring	Indian w/Hen	Springfield	KK	1	0.083	0.083	0.083
2	Cav w/Spring	Indian w/Sha	Colt 1873	KK	1	0.048	0.048	0.048
2	Cav w/Spring	Indian w/Rif	Springfield	KK	3	0.052	0.183	0.114
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	7	0.032	0.049	0.042
2	Cav w/Spring	Indian w/Smo	Colt 1873	MFP	2	0.038	0.041	0.039
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	1	0.026	0.026	0.026
2	Cav w/Spring	Indian w/Bow	Springfield	MS	175	0.014	0.215	0.108
2	Cav w/Spring	Indian w/Win	Springfield	MS	71	0.087	0.179	0.111
2	Cav w/Spring	Indian w/Sha	Springfield	MS	19	0.076	0.208	0.117
2	Cav w/Spring	Indian w/Rif	Springfield	MS	37	0.048	0.187	0.111
2	Cav w/Spring	Indian w/Spr	Springfield	MS	8	0.063	0.115	0.103
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	2	0.099	0.101	0.100
2	Cav w/Spring	Indian w/Smo	Springfield	MS	27	0.057	0.194	0.115
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	1	0.113	0.113	0.113
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	6	0.075	0.124	0.095
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	1	0.117	0.117	0.117
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	8	0.038	0.121	0.082
2	Cav w/Spring	Indian w/Rif	Springfield	MOB	2	0.080	0.092	0.086
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	2	0.082	0.087	0.085
2	Cav w/Spring	Indian w/Bow	Springfield	KK	6	0.086	0.110	0.103
2	Cav w/Spring	Indian w/Win	Springfield	MOB	1	0.108	0.108	0.108
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	1	0.127	0.127	0.127
2	Cav w/Spring	Indian w/Win	Springfield	DUD	3	0.093	0.106	0.101
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	2	0.102	0.147	0.124
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	4	0.065	0.195	0.106
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	1	0.168	0.168	0.168
2	Cav w/Spring	Indian w/Win	Springfield	MFP	3	0.028	0.171	0.080
2	Cav w/Spring	Indian w/Win	Springfield	KK	1	0.076	0.076	0.076
2	Cav w/Spring	Indian w/Sha	Colt 1873	NE	2	0.034	0.047	0.041
2	Cav w/Spring	Indian w/Sha	Colt 1873	MS	5	0.016	0.047	0.037
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.040	0.040	0.040
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	4	0.026	0.047	0.033

2	Cav w/Spring	Indian w/Rif	Springfield	MFP	1	0.080	0.080	0.080
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	2	0.040	0.047	0.044
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	1	0.031	0.031	0.031
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	5	0.031	0.046	0.037
2	Cav w/Spring	Indian w/Win	Springfield	SUS	1	0.147	0.147	0.147
2	Cav w/Spring	Indian w/Bow	Springfield	FP	1	0.122	0.122	0.122
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	2	0.026	0.041	0.034
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	1	0.147	0.147	0.147
2	Cav w/Spring	Indian w/Rif	Springfield	FP	1	0.074	0.074	0.074
2	Cav w/Spring	Indian w/Smo	Springfield	FP	1	0.062	0.062	0.062
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	1	0.085	0.085	0.085
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	4	0.040	0.050	0.044
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	1	0.045	0.045	0.045
2	Cav w/Spring	Indian w/Win	Colt 1873	MFP	1	0.033	0.033	0.033
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.040	0.040	0.040

Fox 3-7 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	6	0.091	0.128	0.105
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1600	0.055	0.215	0.144
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2717	0.080	0.189	0.137
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	11	0.069	0.182	0.121
1	Indian w/Spr	Cav w/Spring	Springfield	MS	211	0.066	0.205	0.135
1	Indian w/Smo	Cav w/Spring	Springfield	MS	351	0.072	0.198	0.137
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	26	0.091	0.175	0.126
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	15	0.079	0.190	0.146
1	Indian w/Rif	Cav w/Spring	Springfield	MS	445	0.066	0.197	0.134
1	Indian w/Sha	Cav w/Spring	Springfield	KK	11	0.058	0.169	0.112
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	62	0.069	0.185	0.143
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	13	0.101	0.172	0.136
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	54	0.081	0.179	0.134
1	Indian w/Sha	Cav w/Spring	Springfield	MS	448	0.060	0.185	0.129
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	16	0.072	0.179	0.122
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	14	0.072	0.174	0.123
1	Indian w/Spr	Cav w/Spring	Springfield	TL	3	0.145	0.154	0.150
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	33	0.086	0.184	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	KK	40	0.081	0.178	0.134
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	104	0.085	0.184	0.137
1	Indian w/Win	Cav w/Spring	Winchester .	FP	9	0.097	0.165	0.125
1	Indian w/Sha	Cav w/Spring	Springfield	FP	5	0.068	0.177	0.110
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	23	0.066	0.189	0.127
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	10	0.089	0.195	0.143
1	Indian w/Win	Cav w/Spring	Winchester .	TL	10	0.100	0.183	0.135
1	Indian w/Bow	Cav w/Spring	45CAL	MS	5535	0.001	0.051	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	245	0.001	0.050	0.032
1	Indian w/Bow	Cav w/Spring	45CAL	KK	72	0.005	0.049	0.029
1	Indian w/Bow	Cav w/Spring	45CAL	TL	54	0.011	0.049	0.036
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	55	0.010	0.049	0.032
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	24	0.064	0.184	0.124
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	12	0.074	0.184	0.111
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	4	0.089	0.164	0.132
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	9	0.090	0.193	0.136
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	4	0.095	0.150	0.110
1	Indian w/Smo	Cav w/Spring	Springfield	MOB	4	0.083	0.189	0.127
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	44	0.055	0.188	0.132
1	Indian w/Rif	Cav w/Spring	Springfield	FP	1	0.092	0.092	0.092
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	3	0.077	0.082	0.081
1	Indian w/Spr	Cav w/Spring	Springfield	KK	8	0.076	0.209	0.129
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	13	0.076	0.189	0.110
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	15	0.081	0.192	0.131
1	Indian w/Sha	Cav w/Spring	Springfield	TL	5	0.123	0.172	0.155
1	Indian w/Smo	Cav w/Spring	Springfield	KK	10	0.057	0.203	0.140
1	Indian w/Rif	Cav w/Spring	Springfield	MOB	3	0.094	0.186	0.140
1	Indian w/Rif	Cav w/Spring	Springfield	KK	4	0.075	0.111	0.091
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	2	0.081	0.110	0.095
1	Indian w/Smo	Cav w/Spring	Springfield	TL	6	0.074	0.206	0.153
1	Indian w/Spr	Cav w/Spring	Springfield	FP	1	0.167	0.167	0.167
1	Indian w/Rif	Cav w/Spring	Springfield	TL	2	0.155	0.161	0.158
1	Indian w/Spr	Cav w/Spring	Springfield	MOB	2	0.139	0.146	0.143
1	Indian w/Bow	Cav w/Spring	45CAL	FP	1	0.049	0.049	0.049
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	5	0.019	0.046	0.033
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	2	0.070	0.153	0.112
2	Cav w/Spring	Indian w/Win	Springfield	MS	69	0.063	0.167	0.111
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	2	0.039	0.081	0.060
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	12	0.030	0.050	0.041

2	Cav w/Spring	Indian w/Win	Colt 1873	KK	3	0.023	0.044	0.034
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	1	0.045	0.045	0.045
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.045	0.045	0.045
2	Cav w/Spring	Indian w/Smo	Springfield	MS	26	0.043	0.168	0.113
2	Cav w/Spring	Indian w/Bow	Springfield	KK	11	0.013	0.175	0.084
2	Cav w/Spring	Indian w/Bow	Springfield	MS	268	0.021	0.274	0.117
2	Cav w/Spring	Indian w/Rif	Colt 1873	MFP	1	0.024	0.024	0.024
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	3	0.045	0.112	0.069
2	Cav w/Spring	Indian w/Sha	Springfield	MS	26	0.040	0.155	0.107
2	Cav w/Spring	Indian w/Rif	Springfield	MS	55	0.081	0.198	0.118
2	Cav w/Spring	Indian w/Hen	Springfield	MS	20	0.036	0.189	0.099
2	Cav w/Spring	Indian w/Spr	Springfield	MS	12	0.091	0.160	0.124
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	3	0.115	0.121	0.118
2	Cav w/Spring	Indian w/Rif	Springfield	KK	2	0.018	0.099	0.059
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	6	0.017	0.107	0.070
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	2	0.099	0.121	0.110
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	11	0.080	0.248	0.128
2	Cav w/Spring	Indian w/Hen	Springfield	KK	6	0.057	0.162	0.099
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	1	0.098	0.098	0.098
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	20	0.005	0.174	0.099
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	2	0.058	0.109	0.084
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	2	0.081	0.091	0.086
2	Cav w/Spring	Indian w/Rif	Springfield	MFP	1	0.081	0.081	0.081
2	Cav w/Spring	Indian w/Win	Springfield	SUS	3	0.110	0.169	0.142
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	3	0.024	0.124	0.060
2	Cav w/Spring	Indian w/Win	Springfield	MFP	1	0.191	0.191	0.191
2	Cav w/Spring	Indian w/Win	Colt 1873	MFP	1	0.050	0.050	0.050
2	Cav w/Spring	Indian w/Spr	Colt 1873	MS	2	0.025	0.047	0.036
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.047	0.047	0.047
2	Cav w/Spring	Indian w/Rif	Springfield	FP	1	0.100	0.100	0.100
2	Cav w/Spring	Indian w/Win	Colt 1873	FP	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Hen	Colt 1873	NE	2	0.010	0.011	0.011
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.010	0.010	0.010
2	Cav w/Spring	Indian w/Spr	Colt 1873	SUS	1	0.025	0.025	0.025
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	6	0.008	0.022	0.016
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	4	0.006	0.025	0.013
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	2	0.006	0.025	0.015
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	3	0.030	0.037	0.035
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	1	0.015	0.015	0.015
2	Cav w/Spring	Indian w/Hen	Springfield	FP	1	0.119	0.119	0.119
2	Cav w/Spring	Indian w/Bow	Springfield	FP	1	0.114	0.114	0.114
2	Cav w/Spring	Indian w/Win	Springfield	DUD	2	0.110	0.120	0.115
2	Cav w/Spring	Indian w/Win	Springfield	KK	1	0.109	0.109	0.109
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	6	0.014	0.033	0.024

Fox 3-8 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2467	0.080	0.185	0.138
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1646	0.069	0.203	0.144
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	21	0.052	0.184	0.121
1	Indian w/Smo	Cav w/Spring	Springfield	MS	361	0.063	0.193	0.135
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	87	0.085	0.184	0.141
1	Indian w/Rif	Cav w/Spring	Springfield	MS	459	0.049	0.185	0.133
1	Indian w/Sha	Cav w/Spring	Springfield	MS	437	0.051	0.185	0.134
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	79	0.080	0.181	0.128
1	Indian w/Win	Cav w/Spring	Winchester .	KK	43	0.091	0.175	0.131
1	Indian w/Spr	Cav w/Spring	Springfield	MS	221	0.062	0.195	0.135
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	57	0.071	0.184	0.127
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	17	0.074	0.168	0.122
1	Indian w/Smo	Cav w/Spring	Springfield	KK	11	0.079	0.179	0.130
1	Indian w/Win	Cav w/Spring	Winchester .	TL	20	0.108	0.178	0.150
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	26	0.071	0.176	0.153
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	29	0.086	0.183	0.133
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	3	0.086	0.154	0.132
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	22	0.063	0.179	0.120
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	64	0.077	0.189	0.147
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	2	0.134	0.136	0.135
1	Indian w/Win	Cav w/Spring	Winchester .	FP	3	0.110	0.131	0.122
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	12	0.076	0.182	0.137
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	22	0.069	0.170	0.131
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	6	0.085	0.153	0.125
1	Indian w/Smo	Cav w/Spring	Springfield	MOB	5	0.089	0.144	0.113
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	2	0.090	0.124	0.107
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	12	0.068	0.175	0.117
1	Indian w/Bow	Cav w/Spring	45CAL	MS	5340	0.004	0.051	0.039

1	Indian w/Bow	Cav w/Spring	45CAL	SUS	235	0.003	0.050	0.034
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	61	0.007	0.050	0.033
1	Indian w/Bow	Cav w/Spring	45CAL	KK	71	0.005	0.049	0.030
1	Indian w/Bow	Cav w/Spring	45CAL	TL	62	0.013	0.050	0.039
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	19	0.078	0.185	0.128
1	Indian w/Sha	Cav w/Spring	Springfield	TL	6	0.072	0.148	0.126
1	Indian w/Sha	Cav w/Spring	Springfield	KK	8	0.074	0.171	0.123
1	Indian w/Rif	Cav w/Spring	Springfield	KK	16	0.051	0.170	0.105
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	11	0.077	0.181	0.116
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	12	0.079	0.162	0.113
1	Indian w/Rif	Cav w/Spring	Springfield	FP	7	0.067	0.177	0.124
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	11	0.073	0.147	0.109
1	Indian w/Spr	Cav w/Spring	Springfield	KK	5	0.067	0.158	0.104
1	Indian w/Rif	Cav w/Spring	Springfield	TL	5	0.095	0.181	0.136
1	Indian w/Smo	Cav w/Spring	Springfield	TL	7	0.088	0.194	0.159
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	5	0.113	0.171	0.139
1	Indian w/Sha	Cav w/Spring	Springfield	FP	2	0.083	0.156	0.120
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	4	0.070	0.171	0.137
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	4	0.082	0.148	0.109
1	Indian w/Smo	Cav w/Spring	Springfield	FP	2	0.103	0.142	0.123
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	5	0.058	0.147	0.103
1	Indian w/Spr	Cav w/Spring	Springfield	TL	3	0.112	0.148	0.135
1	Indian w/Bow	Cav w/Spring	45CAL	FP	1	0.042	0.042	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	1	0.023	0.023	0.023
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	9	0.011	0.187	0.096
2	Cav w/Spring	Indian w/Hen	Springfield	MS	44	0.018	0.277	0.124
2	Cav w/Spring	Indian w/Spr	Springfield	MS	15	0.018	0.246	0.101
2	Cav w/Spring	Indian w/Win	Springfield	DUD	6	0.037	0.200	0.104
2	Cav w/Spring	Indian w/Win	Springfield	MS	99	0.021	0.269	0.112
2	Cav w/Spring	Indian w/Sha	Colt 1873	MS	6	0.022	0.050	0.037
2	Cav w/Spring	Indian w/Win	Springfield	SUS	12	0.012	0.215	0.076
2	Cav w/Spring	Indian w/Sha	Colt 1873	MFP	2	0.042	0.047	0.044
2	Cav w/Spring	Indian w/Rif	Springfield	MS	65	0.008	0.209	0.100
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	6	0.031	0.202	0.082
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	6	0.007	0.043	0.027
2	Cav w/Spring	Indian w/Sha	Colt 1873	NE	3	0.026	0.050	0.039
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	8	0.034	0.043	0.039
2	Cav w/Spring	Indian w/Sha	Colt 1873	MOB	1	0.045	0.045	0.045
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	5	0.028	0.048	0.037
2	Cav w/Spring	Indian w/Win	Springfield	KK	13	0.014	0.111	0.046
2	Cav w/Spring	Indian w/Win	Colt 1873	MFP	1	0.028	0.028	0.028
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	5	0.014	0.117	0.057
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	42	0.020	0.205	0.077
2	Cav w/Spring	Indian w/Hen	Colt 1873	MS	4	0.023	0.043	0.035
2	Cav w/Spring	Indian w/Bow	Springfield	MS	356	0.010	0.283	0.111
2	Cav w/Spring	Indian w/Smo	Springfield	MS	51	0.016	0.285	0.110
2	Cav w/Spring	Indian w/Bow	Springfield	FP	10	0.006	0.158	0.069
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	6	0.015	0.049	0.034
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	18	0.007	0.048	0.028
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	12	0.015	0.048	0.032
2	Cav w/Spring	Indian w/Sha	Springfield	MS	33	0.018	0.285	0.117
2	Cav w/Spring	Indian w/Win	Springfield	FP	3	0.010	0.110	0.074
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	1	0.113	0.113	0.113
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	2	0.084	0.088	0.086
2	Cav w/Spring	Indian w/Hen	Springfield	KK	6	0.054	0.138	0.080
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	4	0.006	0.237	0.114
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	13	0.028	0.130	0.085
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	15	0.009	0.281	0.090
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	5	0.052	0.260	0.128
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	11	0.020	0.279	0.086
2	Cav w/Spring	Indian w/Sha	Springfield	FP	1	0.115	0.115	0.115
2	Cav w/Spring	Indian w/Bow	Springfield	KK	28	0.016	0.284	0.081
2	Cav w/Spring	Indian w/Spr	Colt 1873	MS	3	0.044	0.048	0.047
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	8	0.016	0.202	0.087
2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	5	0.041	0.051	0.045
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.018	0.018	0.018
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	7	0.013	0.162	0.060
2	Cav w/Spring	Indian w/Sha	Springfield	MFP	2	0.014	0.076	0.045
2	Cav w/Spring	Indian w/Sha	Colt 1873	KK	1	0.026	0.026	0.026
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	3	0.044	0.051	0.047
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	2	0.022	0.022	0.022
2	Cav w/Spring	Indian w/Smo	Springfield	KK	5	0.044	0.229	0.095
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	4	0.039	0.275	0.121
2	Cav w/Spring	Indian w/Rif	Springfield	MOB	3	0.048	0.283	0.130
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	1	0.006	0.006	0.006
2	Cav w/Spring	Indian w/Bow	Colt 1873	MOB	2	0.013	0.040	0.027
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	1	0.006	0.006	0.006
2	Cav w/Spring	Indian w/Hen	Colt 1873	NE	8	0.014	0.045	0.037

2	Cav w/Spring	Indian w/Rif	Springfield	MFP	4	0.013	0.090	0.042
2	Cav w/Spring	Indian w/Hen	Colt 1873	MFP	2	0.006	0.037	0.021
2	Cav w/Spring	Indian w/Sha	Colt 1873	FP	1	0.029	0.029	0.029
2	Cav w/Spring	Indian w/Spr	Springfield	MFP	1	0.137	0.137	0.137
2	Cav w/Spring	Indian w/Hen	Colt 1873	FP	1	0.018	0.018	0.018
2	Cav w/Spring	Indian w/Win	Springfield	MOB	3	0.006	0.057	0.035
2	Cav w/Spring	Indian w/Win	Springfield	MFP	1	0.066	0.066	0.066
2	Cav w/Spring	Indian w/Win	Colt 1873	FP	1	0.011	0.011	0.011
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.039	0.039	0.039
2	Cav w/Spring	Indian w/Smo	Springfield	MOB	2	0.017	0.067	0.042
2	Cav w/Spring	Indian w/Hen	Springfield	FP	1	0.060	0.060	0.060
2	Cav w/Spring	Indian w/Spr	Springfield	FP	1	0.056	0.056	0.056
2	Cav w/Spring	Indian w/Sha	Springfield	KK	3	0.015	0.173	0.072
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.030	0.030	0.030
2	Cav w/Spring	Indian w/Rif	Springfield	KK	2	0.023	0.134	0.078
2	Cav w/Spring	Indian w/Spr	Springfield	MOB	1	0.100	0.100	0.100

Fox 3-9 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Spr	Cav w/Spring	Springfield	MS	192	0.068	0.190	0.136
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	12	0.103	0.180	0.133
1	Indian w/Sha	Cav w/Spring	Springfield	MS	393	0.067	0.185	0.131
1	Indian w/Rif	Cav w/Spring	Springfield	MS	445	0.054	0.186	0.130
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1505	0.057	0.195	0.143
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2478	0.063	0.185	0.137
1	Indian w/Smo	Cav w/Spring	Springfield	MS	355	0.063	0.185	0.133
1	Indian w/Win	Cav w/Spring	Winchester .	MFP	20	0.085	0.176	0.130
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	9	0.081	0.184	0.133
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	3	0.097	0.145	0.127
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	58	0.086	0.181	0.129
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	37	0.078	0.175	0.123
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	51	0.078	0.183	0.139
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	7	0.072	0.144	0.113
1	Indian w/Win	Cav w/Spring	Winchester .	FP	11	0.084	0.170	0.133
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	67	0.079	0.180	0.139
1	Indian w/Win	Cav w/Spring	Winchester .	KK	50	0.078	0.180	0.135
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	20	0.077	0.168	0.126
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	37	0.058	0.192	0.119
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	20	0.092	0.175	0.151
1	Indian w/Smo	Cav w/Spring	Springfield	TL	6	0.140	0.178	0.163
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	3	0.063	0.161	0.116
1	Indian w/Win	Cav w/Spring	Winchester .	TL	16	0.102	0.184	0.148
1	Indian w/Bow	Cav w/Spring	45CAL	MS	5988	0.005	0.051	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	238	0.006	0.050	0.035
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	80	0.006	0.046	0.030
1	Indian w/Bow	Cav w/Spring	45CAL	KK	67	0.010	0.047	0.030
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	14	0.110	0.183	0.135
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	9	0.083	0.166	0.113
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	22	0.076	0.175	0.113
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	9	0.079	0.185	0.131
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	2	0.110	0.115	0.112
1	Indian w/Spr	Cav w/Spring	Springfield	KK	7	0.081	0.141	0.109
1	Indian w/Rif	Cav w/Spring	Springfield	KK	15	0.060	0.156	0.110
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	10	0.078	0.157	0.108
1	Indian w/Smo	Cav w/Spring	Springfield	MOB	1	0.084	0.084	0.084
1	Indian w/Sha	Cav w/Spring	Springfield	KK	8	0.076	0.154	0.117
1	Indian w/Rif	Cav w/Spring	Springfield	MOB	2	0.093	0.112	0.102
1	Indian w/Sha	Cav w/Spring	Springfield	TL	5	0.098	0.184	0.150
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	4	0.078	0.177	0.121
1	Indian w/Smo	Cav w/Spring	Springfield	KK	11	0.074	0.173	0.118
1	Indian w/Spr	Cav w/Spring	Springfield	TL	7	0.109	0.168	0.146
1	Indian w/Smo	Cav w/Spring	Springfield	FP	1	0.068	0.068	0.068
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	13	0.057	0.171	0.123
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	4	0.013	0.048	0.027
1	Indian w/Bow	Cav w/Spring	45CAL	TL	50	0.015	0.050	0.038
1	Indian w/Sha	Cav w/Spring	Springfield	FP	2	0.084	0.175	0.130
1	Indian w/Spr	Cav w/Spring	Springfield	FP	1	0.080	0.080	0.080
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	2	0.120	0.165	0.143
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	3	0.099	0.150	0.131
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	4	0.085	0.141	0.122
1	Indian w/Rif	Cav w/Spring	Springfield	TL	3	0.145	0.161	0.154
1	Indian w/Rif	Cav w/Spring	Springfield	FP	1	0.154	0.154	0.154
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	17	0.033	0.148	0.090
2	Cav w/Spring	Indian w/Bow	Springfield	MS	311	0.013	0.181	0.107
2	Cav w/Spring	Indian w/Sha	Springfield	MS	24	0.057	0.128	0.111

2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	12	0.035	0.048	0.042
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	11	0.028	0.050	0.039
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	11	0.001	0.045	0.021
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	3	0.035	0.048	0.040
2	Cav w/Spring	Indian w/Win	Colt 1873	KK	6	0.034	0.050	0.041
2	Cav w/Spring	Indian w/Rif	Colt 1873	FP	1	0.047	0.047	0.047
2	Cav w/Spring	Indian w/Sha	Colt 1873	MS	2	0.028	0.029	0.028
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	3	0.045	0.094	0.072
2	Cav w/Spring	Indian w/Win	Springfield	KK	7	0.015	0.111	0.067
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	7	0.031	0.047	0.038
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.063	0.063	0.063
2	Cav w/Spring	Indian w/Win	Springfield	MS	97	0.022	0.147	0.106
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	1	0.028	0.028	0.028
2	Cav w/Spring	Indian w/Sha	Springfield	MOB	1	0.014	0.014	0.014
2	Cav w/Spring	Indian w/Rif	Springfield	MS	51	0.009	0.129	0.107
2	Cav w/Spring	Indian w/Smo	Springfield	MS	32	0.019	0.193	0.103
2	Cav w/Spring	Indian w/Win	Springfield	DUD	2	0.117	0.124	0.120
2	Cav w/Spring	Indian w/Hen	Springfield	MS	26	0.051	0.206	0.107
2	Cav w/Spring	Indian w/Win	Springfield	SUS	4	0.023	0.115	0.085
2	Cav w/Spring	Indian w/Smo	Springfield	MOB	1	0.090	0.090	0.090
2	Cav w/Spring	Indian w/Spr	Springfield	MS	11	0.089	0.192	0.119
2	Cav w/Spring	Indian w/Rif	Springfield	KK	2	0.092	0.101	0.097
2	Cav w/Spring	Indian w/Spr	Springfield	MFP	1	0.082	0.082	0.082
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	7	0.030	0.163	0.102
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	4	0.057	0.129	0.104
2	Cav w/Spring	Indian w/Bow	Springfield	KK	12	0.009	0.176	0.076
2	Cav w/Spring	Indian w/Bow	Springfield	FP	1	0.111	0.111	0.111
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	2	0.067	0.122	0.095
2	Cav w/Spring	Indian w/Smo	Springfield	KK	2	0.039	0.071	0.055
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	5	0.008	0.209	0.127
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	12	0.035	0.212	0.081
2	Cav w/Spring	Indian w/Smo	Colt 1873	MFP	2	0.031	0.038	0.035
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	6	0.012	0.036	0.024
2	Cav w/Spring	Indian w/Rif	Springfield	MFP	3	0.028	0.052	0.043
2	Cav w/Spring	Indian w/Bow	Colt 1873	MFP	5	0.021	0.041	0.028
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	2	0.035	0.070	0.052
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	13	0.019	0.050	0.032
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	2	0.029	0.039	0.034
2	Cav w/Spring	Indian w/Sha	Springfield	KK	1	0.065	0.065	0.065
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	1	0.049	0.049	0.049
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	3	0.016	0.060	0.032
2	Cav w/Spring	Indian w/Rif	Springfield	MOB	1	0.059	0.059	0.059
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	1	0.054	0.054	0.054
2	Cav w/Spring	Indian w/Hen	Springfield	MOB	2	0.058	0.064	0.061
2	Cav w/Spring	Indian w/Smo	Colt 1873	FP	1	0.044	0.044	0.044
2	Cav w/Spring	Indian w/Hen	Colt 1873	NE	2	0.045	0.048	0.046
2	Cav w/Spring	Indian w/Win	Colt 1873	MFP	1	0.028	0.028	0.028
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	3	0.011	0.083	0.059
2	Cav w/Spring	Indian w/Hen	Springfield	KK	4	0.055	0.198	0.120
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.043	0.043	0.043
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.046	0.046	0.046
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	3	0.025	0.051	0.042
2	Cav w/Spring	Indian w/Sha	Springfield	MFP	1	0.017	0.017	0.017
2	Cav w/Spring	Indian w/Spr	Springfield	KK	1	0.071	0.071	0.071

Fox 3-10 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Smo	Cav w/Spring	Springfield	MS	327	0.057	0.185	0.132
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	1403	0.074	0.194	0.140
1	Indian w/Sha	Cav w/Spring	Springfield	MS	384	0.057	0.190	0.129
1	Indian w/Rif	Cav w/Spring	Springfield	MS	394	0.059	0.197	0.130
1	Indian w/Win	Cav w/Spring	Winchester .	MS	2397	0.060	0.194	0.134
1	Indian w/Win	Cav w/Spring	Winchester .	KK	52	0.056	0.176	0.122
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	9	0.088	0.160	0.126
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	6	0.079	0.184	0.137
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	21	0.085	0.182	0.125
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	19	0.061	0.174	0.113
1	Indian w/Spr	Cav w/Spring	Springfield	MS	179	0.061	0.190	0.128
1	Indian w/Rif	Cav w/Spring	Springfield	MFP	8	0.076	0.173	0.133
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	16	0.060	0.165	0.099
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	50	0.087	0.177	0.127
1	Indian w/Sha	Cav w/Spring	Springfield	MOB	2	0.126	0.126	0.126
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	79	0.093	0.186	0.133
1	Indian w/Win	Cav w/Spring	Winchester .	FP	13	0.085	0.174	0.116
1	Indian w/Sha	Cav w/Spring	Springfield	MFP	5	0.099	0.155	0.129

1	Indian w/Win	Cav w/Spring	Winchester .	MFP	30	0.081	0.179	0.128
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	12	0.097	0.180	0.138
1	Indian w/Rif	Cav w/Spring	Springfield	TL	8	0.089	0.169	0.132
1	Indian w/Smo	Cav w/Spring	Springfield	TL	3	0.096	0.147	0.117
1	Indian w/Rif	Cav w/Spring	Springfield	KK	12	0.058	0.152	0.097
1	Indian w/Win	Cav w/Spring	Winchester .	TL	16	0.101	0.185	0.139
1	Indian w/Bow	Cav w/Spring	45CAL	MS	5344	0.006	0.051	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	251	0.001	0.050	0.034
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	63	0.009	0.050	0.031
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	14	0.105	0.172	0.133
1	Indian w/Win	Cav w/Spring	Winchester .	MOB	8	0.095	0.150	0.121
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	37	0.083	0.183	0.135
1	Indian w/Spr	Cav w/Spring	Springfield	KK	8	0.070	0.167	0.120
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	23	0.074	0.178	0.126
1	Indian w/Smo	Cav w/Spring	Springfield	KK	17	0.069	0.173	0.121
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	3	0.091	0.166	0.128
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	15	0.075	0.186	0.131
1	Indian w/Rif	Cav w/Spring	Springfield	FP	1	0.093	0.093	0.093
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	8	0.083	0.170	0.113
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	21	0.081	0.175	0.123
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	13	0.078	0.164	0.122
1	Indian w/Sha	Cav w/Spring	Springfield	KK	8	0.075	0.170	0.120
1	Indian w/Sha	Cav w/Spring	Springfield	TL	3	0.098	0.173	0.124
1	Indian w/Bow	Cav w/Spring	45CAL	KK	58	0.010	0.050	0.031
1	Indian w/Spr	Cav w/Spring	Springfield	MOB	1	0.107	0.107	0.107
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	6	0.075	0.172	0.125
1	Indian w/Bow	Cav w/Spring	45CAL	TL	53	0.004	0.050	0.037
1	Indian w/Smo	Cav w/Spring	Springfield	MFP	1	0.092	0.092	0.092
1	Indian w/Spr	Cav w/Spring	Springfield	MFP	4	0.070	0.169	0.135
1	Indian w/Rif	Cav w/Spring	Springfield	MOB	1	0.063	0.063	0.063
1	Indian w/Sha	Cav w/Spring	Springfield	FP	2	0.106	0.166	0.136
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	2	0.041	0.043	0.042
1	Indian w/Smo	Cav w/Spring	Springfield	FP	1	0.148	0.148	0.148
1	Indian w/Spr	Cav w/Spring	Springfield	TL	3	0.114	0.177	0.148
2	Cav w/Spring	Indian w/Bow	Springfield	MS	344	0.009	0.234	0.114
2	Cav w/Spring	Indian w/Bow	Springfield	KK	19	0.015	0.227	0.072
2	Cav w/Spring	Indian w/Win	Springfield	MS	74	0.033	0.216	0.109
2	Cav w/Spring	Indian w/Sha	Springfield	MS	22	0.024	0.127	0.104
2	Cav w/Spring	Indian w/Rif	Springfield	MS	45	0.007	0.222	0.110
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	3	0.115	0.127	0.121
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	8	0.009	0.259	0.082
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	5	0.030	0.262	0.111
2	Cav w/Spring	Indian w/Smo	Springfield	MS	33	0.025	0.255	0.113
2	Cav w/Spring	Indian w/Hen	Springfield	MS	25	0.012	0.250	0.113
2	Cav w/Spring	Indian w/Rif	Springfield	KK	7	0.019	0.261	0.119
2	Cav w/Spring	Indian w/Win	Springfield	FP	2	0.101	0.104	0.103
2	Cav w/Spring	Indian w/Spr	Springfield	MS	11	0.041	0.141	0.102
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	1	0.131	0.131	0.131
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.104	0.104	0.104
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	13	0.022	0.125	0.092
2	Cav w/Spring	Indian w/Win	Springfield	KK	4	0.022	0.105	0.068
2	Cav w/Spring	Indian w/Sha	Springfield	MOB	1	0.121	0.121	0.121
2	Cav w/Spring	Indian w/Win	Springfield	SUS	9	0.007	0.269	0.204
2	Cav w/Spring	Indian w/Smo	Springfield	MFP	3	0.036	0.108	0.077
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	8	0.018	0.253	0.120
2	Cav w/Spring	Indian w/Win	Springfield	DUD	2	0.096	0.111	0.104
2	Cav w/Spring	Indian w/Smo	Springfield	KK	5	0.021	0.079	0.048
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	21	0.017	0.216	0.090
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	3	0.019	0.042	0.028
2	Cav w/Spring	Indian w/Smo	Colt 1873	FP	1	0.042	0.042	0.042
2	Cav w/Spring	Indian w/Hen	Springfield	KK	7	0.023	0.192	0.068
2	Cav w/Spring	Indian w/Hen	Colt 1873	NE	2	0.021	0.021	0.021
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.023	0.023	0.023
2	Cav w/Spring	Indian w/Win	Colt 1873	MFP	3	0.019	0.044	0.036
2	Cav w/Spring	Indian w/Hen	Springfield	FP	1	0.022	0.022	0.022
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	2	0.104	0.118	0.111
2	Cav w/Spring	Indian w/Hen	Springfield	MFP	3	0.033	0.129	0.086
2	Cav w/Spring	Indian w/Sha	Springfield	KK	2	0.031	0.110	0.070
2	Cav w/Spring	Indian w/Win	Springfield	MFP	1	0.076	0.076	0.076
2	Cav w/Spring	Indian w/Spr	Colt 1873	KK	1	0.020	0.020	0.020
2	Cav w/Spring	Indian w/Bow	Springfield	MOB	3	0.023	0.162	0.081
2	Cav w/Spring	Indian w/Bow	Colt 1873	NE	2	0.027	0.041	0.034
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	10	0.029	0.044	0.037
2	Cav w/Spring	Indian w/Bow	Springfield	MFP	8	0.025	0.178	0.069
2	Cav w/Spring	Indian w/Smo	Colt 1873	NE	1	0.016	0.016	0.016
2	Cav w/Spring	Indian w/Smo	Colt 1873	MFP	1	0.021	0.021	0.021
2	Cav w/Spring	Indian w/Spr	Colt 1873	MOB	1	0.023	0.023	0.023
2	Cav w/Spring	Indian w/Rif	Colt 1873	KK	2	0.018	0.020	0.019
2	Cav w/Spring	Indian w/Bow	Colt 1873	FP	1	0.035	0.035	0.035

2	Cav w/Spring	Indian w/Rif	Colt 1873	MS	6	0.021	0.045	0.039
2	Cav w/Spring	Indian w/Rif	Colt 1873	MFP	1	0.037	0.037	0.037
2	Cav w/Spring	Indian w/Bow	Springfield	FP	4	0.018	0.070	0.040
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	4	0.032	0.242	0.091
2	Cav w/Spring	Indian w/Rif	Colt 1873	FP	1	0.023	0.023	0.023
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	1	0.032	0.032	0.032
2	Cav w/Spring	Indian w/Smo	Springfield	FP	1	0.048	0.048	0.048
2	Cav w/Spring	Indian w/Rif	Springfield	MFP	2	0.041	0.053	0.047
2	Cav w/Spring	Indian w/Hen	Springfield	MOB	1	0.041	0.041	0.041
2	Cav w/Spring	Indian w/Rif	Colt 1873	NE	3	0.018	0.020	0.019
2	Cav w/Spring	Indian w/Sha	Colt 1873	MOB	1	0.005	0.005	0.005
2	Cav w/Spring	Indian w/Win	Springfield	MOB	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Spr	Springfield	KK	2	0.072	0.198	0.135

3. Gray

Gray 3-1 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Rif	Cav w/Spring	Springfield	MS	226	0.063	0.301	0.156
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	826	0.058	0.248	0.126
1	Indian w/Win	Cav w/Spring	Winchester .	MS	933	0.064	0.206	0.119
1	Indian w/Smo	Cav w/Spring	Springfield	MS	222	0.059	0.343	0.169
1	Indian w/Rif	Cav w/Spring	Springfield	KK	27	0.064	0.275	0.131
1	Indian w/Sha	Cav w/Spring	Springfield	MS	190	0.065	0.284	0.137
1	Indian w/Smo	Cav w/Spring	Springfield	KK	22	0.066	0.256	0.154
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	7	0.081	0.255	0.154
1	Indian w/Win	Cav w/Spring	Winchester .	KK	76	0.064	0.245	0.114
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	8	0.099	0.262	0.171
1	Indian w/Spr	Cav w/Spring	Springfield	MS	104	0.060	0.326	0.168
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	21	0.064	0.166	0.116
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	7	0.087	0.146	0.116
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	26	0.069	0.173	0.112
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	10	0.088	0.200	0.134
1	Indian w/Sha	Cav w/Spring	Springfield	KK	31	0.058	0.203	0.106
1	Indian w/Bow	Cav w/Spring	45CAL	MS	283	0.025	0.050	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	12	0.034	0.050	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	3	0.032	0.049	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	TL	8	0.028	0.045	0.037
1	Indian w/Bow	Cav w/Spring	45CAL	KK	3	0.022	0.039	0.031
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	11	0.070	0.176	0.105
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	9	0.102	0.281	0.148
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	33	0.074	0.187	0.115
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	5	0.083	0.170	0.117
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	27	0.088	0.209	0.126
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	7	0.085	0.285	0.185
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	15	0.068	0.176	0.105
1	Indian w/Spr	Cav w/Spring	Springfield	KK	13	0.062	0.255	0.125
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	14	0.062	0.178	0.100
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	4	0.100	0.177	0.132
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	9	0.090	0.237	0.151
1	Indian w/Spr	Cav w/Spring	Springfield	TL	6	0.075	0.170	0.132
1	Indian w/Smo	Cav w/Spring	Springfield	TL	2	0.131	0.244	0.187
1	Indian w/Rif	Cav w/Spring	Springfield	TL	3	0.153	0.259	0.220
1	Indian w/Win	Cav w/Spring	Winchester .	TL	7	0.106	0.245	0.155
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	2	0.127	0.256	0.192
1	Indian w/Sha	Cav w/Spring	Springfield	TL	2	0.159	0.178	0.168
2	Cav w/Spring	Indian w/Win	Springfield	MS	120	0.072	0.247	0.127
2	Cav w/Spring	Indian w/Spr	Springfield	KK	12	0.061	0.237	0.148
2	Cav w/Spring	Indian w/Hen	Springfield	MS	162	0.070	0.265	0.162
2	Cav w/Spring	Indian w/Smo	Springfield	MS	108	0.067	0.255	0.145
2	Cav w/Spring	Indian w/Win	Springfield	KK	48	0.060	0.247	0.178
2	Cav w/Spring	Indian w/Spr	Springfield	MS	29	0.070	0.250	0.143
2	Cav w/Spring	Indian w/Rif	Springfield	MS	109	0.065	0.256	0.142
2	Cav w/Spring	Indian w/Sha	Springfield	MS	40	0.059	0.242	0.131
2	Cav w/Spring	Indian w/Win	Springfield	DUD	8	0.077	0.239	0.120
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	2	0.119	0.236	0.177
2	Cav w/Spring	Indian w/Win	Springfield	SUS	10	0.067	0.245	0.207
2	Cav w/Spring	Indian w/Rif	Springfield	KK	43	0.062	0.254	0.181
2	Cav w/Spring	Indian w/Bow	Springfield	MS	138	0.071	0.228	0.119
2	Cav w/Spring	Indian w/Smo	Springfield	KK	48	0.061	0.248	0.167
2	Cav w/Spring	Indian w/Sha	Springfield	KK	16	0.073	0.249	0.187
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	4	0.073	0.237	0.162
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	21	0.071	0.241	0.182
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	13	0.055	0.239	0.211
2	Cav w/Spring	Indian w/Bow	Springfield	KK	69	0.057	0.226	0.117

2	Cav w/Spring	Indian w/Bow	Springfield	DUD	10	0.074	0.221	0.152
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	17	0.074	0.252	0.190
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.199	0.199	0.199
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	4	0.221	0.259	0.234
2	Cav w/Spring	Indian w/Hen	Springfield	KK	49	0.055	0.239	0.169
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	6	0.071	0.249	0.203
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	2	0.096	0.230	0.163
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	18	0.059	0.236	0.167
2	Cav w/Spring	Indian w/Sha	Springfield	TL	1	0.237	0.237	0.237

Gray 3-2 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Smo	Cav w/Spring	Springfield	MS	197	0.057	0.278	0.141
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	18	0.093	0.157	0.123
1	Indian w/Rif	Cav w/Spring	Springfield	MS	238	0.059	0.269	0.142
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1191	0.062	0.185	0.129
1	Indian w/Sha	Cav w/Spring	Springfield	MS	260	0.052	0.262	0.140
1	Indian w/Spr	Cav w/Spring	Springfield	MS	88	0.072	0.264	0.145
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	971	0.053	0.225	0.129
1	Indian w/Spr	Cav w/Spring	Springfield	KK	17	0.071	0.256	0.138
1	Indian w/Smo	Cav w/Spring	Springfield	KK	25	0.055	0.253	0.130
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	15	0.062	0.249	0.134
1	Indian w/Win	Cav w/Spring	Winchester .	KK	82	0.062	0.248	0.110
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	16	0.075	0.202	0.120
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	45	0.078	0.184	0.135
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	22	0.063	0.171	0.115
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	5	0.113	0.162	0.135
1	Indian w/Win	Cav w/Spring	Winchester .	TL	16	0.095	0.184	0.139
1	Indian w/Bow	Cav w/Spring	45CAL	MS	283	0.020	0.050	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	8	0.025	0.044	0.036
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	2	0.038	0.038	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	KK	3	0.043	0.049	0.046
1	Indian w/Bow	Cav w/Spring	45CAL	TL	8	0.027	0.047	0.041
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	1	0.119	0.119	0.119
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	8	0.074	0.138	0.094
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	32	0.041	0.182	0.124
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	7	0.085	0.225	0.136
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	9	0.077	0.172	0.129
1	Indian w/Sha	Cav w/Spring	Springfield	KK	27	0.071	0.250	0.135
1	Indian w/Rif	Cav w/Spring	Springfield	KK	24	0.055	0.235	0.131
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	13	0.094	0.177	0.146
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	10	0.065	0.233	0.129
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	6	0.099	0.261	0.198
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	3	0.084	0.167	0.134
1	Indian w/Rif	Cav w/Spring	Springfield	TL	3	0.097	0.222	0.168
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	2	0.180	0.262	0.221
1	Indian w/Sha	Cav w/Spring	Springfield	TL	3	0.095	0.180	0.151
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	4	0.044	0.255	0.141
1	Indian w/Spr	Cav w/Spring	Springfield	TL	1	0.289	0.289	0.289
1	Indian w/Smo	Cav w/Spring	Springfield	TL	3	0.149	0.179	0.160
2	Cav w/Spring	Indian w/Hen	Springfield	MS	70	0.061	0.250	0.162
2	Cav w/Spring	Indian w/Win	Springfield	MS	174	0.063	0.261	0.121
2	Cav w/Spring	Indian w/Hen	Springfield	KK	22	0.104	0.228	0.167
2	Cav w/Spring	Indian w/Smo	Springfield	MS	85	0.077	0.270	0.157
2	Cav w/Spring	Indian w/Sha	Springfield	MS	54	0.070	0.264	0.128
2	Cav w/Spring	Indian w/Rif	Springfield	MS	102	0.058	0.268	0.143
2	Cav w/Spring	Indian w/Spr	Springfield	MS	21	0.081	0.213	0.140
2	Cav w/Spring	Indian w/Spr	Springfield	KK	4	0.111	0.229	0.199
2	Cav w/Spring	Indian w/Win	Springfield	KK	19	0.078	0.264	0.213
2	Cav w/Spring	Indian w/Bow	Springfield	MS	119	0.080	0.205	0.125
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	2	0.102	0.241	0.171
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	5	0.092	0.266	0.195
2	Cav w/Spring	Indian w/Smo	Springfield	KK	9	0.077	0.237	0.172
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	2	0.086	0.233	0.160
2	Cav w/Spring	Indian w/Rif	Springfield	KK	13	0.082	0.265	0.212
2	Cav w/Spring	Indian w/Rif	Springfield	TL	1	0.116	0.116	0.116
2	Cav w/Spring	Indian w/Bow	Springfield	KK	8	0.078	0.182	0.117
2	Cav w/Spring	Indian w/Smo	Springfield	TL	1	0.165	0.165	0.165
2	Cav w/Spring	Indian w/Win	Springfield	SUS	8	0.151	0.260	0.231
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	3	0.125	0.250	0.170
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.112	0.112	0.112
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	2	0.097	0.196	0.147
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	2	0.086	0.135	0.111
2	Cav w/Spring	Indian w/Win	Springfield	DUD	2	0.109	0.254	0.182
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	3	0.149	0.247	0.214

2	Cav w/Spring	Indian w/Hen	Springfield	SUS	4	0.131	0.218	0.153
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	2	0.245	0.265	0.255

Gray 3-3 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Smo	Cav w/Spring	Springfield	KK	17	0.072	0.263	0.136
1	Indian w/Rif	Cav w/Spring	Springfield	MS	195	0.045	0.304	0.157
1	Indian w/Rif	Cav w/Spring	Springfield	KK	22	0.075	0.268	0.137
1	Indian w/Smo	Cav w/Spring	Springfield	MS	215	0.050	0.304	0.165
1	Indian w/Win	Cav w/Spring	Winchester .	KK	84	0.051	0.161	0.100
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	19	0.072	0.175	0.107
1	Indian w/Win	Cav w/Spring	Winchester .	MS	739	0.062	0.185	0.114
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	806	0.059	0.248	0.126
1	Indian w/Sha	Cav w/Spring	Springfield	KK	24	0.044	0.207	0.107
1	Indian w/Spr	Cav w/Spring	Springfield	MS	76	0.072	0.289	0.144
1	Indian w/Win	Cav w/Spring	Winchester .	TL	14	0.091	0.249	0.149
1	Indian w/Sha	Cav w/Spring	Springfield	MS	146	0.054	0.274	0.138
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	28	0.075	0.182	0.131
1	Indian w/Spr	Cav w/Spring	Springfield	TL	5	0.101	0.224	0.154
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	12	0.098	0.178	0.139
1	Indian w/Bow	Cav w/Spring	45CAL	MS	544	0.031	0.051	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	21	0.034	0.049	0.044
1	Indian w/Bow	Cav w/Spring	45CAL	KK	5	0.040	0.044	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	TL	9	0.031	0.046	0.041
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	27	0.071	0.162	0.109
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	21	0.057	0.246	0.107
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	23	0.069	0.192	0.111
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	13	0.089	0.159	0.122
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	11	0.086	0.234	0.149
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	5	0.077	0.272	0.145
1	Indian w/Spr	Cav w/Spring	Springfield	KK	15	0.079	0.256	0.136
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	7	0.131	0.282	0.218
1	Indian w/Sha	Cav w/Spring	Springfield	TL	2	0.087	0.145	0.116
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	4	0.078	0.184	0.138
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	5	0.079	0.208	0.149
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	6	0.097	0.195	0.144
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	7	0.083	0.235	0.135
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	3	0.098	0.203	0.163
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	2	0.041	0.046	0.043
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	1	0.132	0.132	0.132
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	3	0.102	0.107	0.104
1	Indian w/Rif	Cav w/Spring	Springfield	TL	4	0.090	0.265	0.193
1	Indian w/Smo	Cav w/Spring	Springfield	TL	2	0.121	0.170	0.145
2	Cav w/Spring	Indian w/Hen	Springfield	MS	162	0.068	0.258	0.165
2	Cav w/Spring	Indian w/Hen	Springfield	KK	17	0.083	0.208	0.168
2	Cav w/Spring	Indian w/Smo	Springfield	MS	121	0.062	0.236	0.153
2	Cav w/Spring	Indian w/Smo	Springfield	KK	27	0.071	0.219	0.180
2	Cav w/Spring	Indian w/Win	Springfield	MS	99	0.068	0.220	0.119
2	Cav w/Spring	Indian w/Rif	Springfield	MS	120	0.058	0.228	0.147
2	Cav w/Spring	Indian w/Sha	Springfield	MS	30	0.075	0.194	0.130
2	Cav w/Spring	Indian w/Win	Springfield	KK	41	0.073	0.222	0.176
2	Cav w/Spring	Indian w/Spr	Springfield	MS	30	0.069	0.220	0.140
2	Cav w/Spring	Indian w/Win	Springfield	SUS	6	0.102	0.220	0.185
2	Cav w/Spring	Indian w/Win	Springfield	DUD	3	0.081	0.213	0.126
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	4	0.090	0.208	0.173
2	Cav w/Spring	Indian w/Sha	Springfield	KK	13	0.073	0.222	0.178
2	Cav w/Spring	Indian w/Bow	Springfield	MS	84	0.068	0.230	0.134
2	Cav w/Spring	Indian w/Rif	Springfield	KK	32	0.069	0.225	0.181
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	4	0.122	0.196	0.147
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	1	0.131	0.131	0.131
2	Cav w/Spring	Indian w/Bow	Springfield	KK	7	0.073	0.106	0.092
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	4	0.127	0.202	0.165
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	2	0.080	0.195	0.138
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	6	0.076	0.192	0.126
2	Cav w/Spring	Indian w/Spr	Springfield	KK	10	0.072	0.208	0.170
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	13	0.139	0.222	0.193
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	2	0.095	0.098	0.096
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	5	0.166	0.205	0.181
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	6	0.173	0.217	0.186
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.171	0.171	0.171
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	5	0.194	0.223	0.207

Gray 3-4 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	MS	999	0.057	0.249	0.122
1	Indian w/Rif	Cav w/Spring	Springfield	MS	245	0.045	0.305	0.160
1	Indian w/Smo	Cav w/Spring	Springfield	MS	212	0.048	0.300	0.152
1	Indian w/Spr	Cav w/Spring	Springfield	MS	88	0.060	0.312	0.150
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	832	0.056	0.211	0.123
1	Indian w/Win	Cav w/Spring	Winchester .	KK	83	0.060	0.248	0.109
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	36	0.077	0.178	0.118
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	20	0.056	0.176	0.117
1	Indian w/Sha	Cav w/Spring	Springfield	MS	187	0.052	0.278	0.141
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	3	0.098	0.168	0.131
1	Indian w/Rif	Cav w/Spring	Springfield	KK	25	0.079	0.266	0.138
1	Indian w/Sha	Cav w/Spring	Springfield	TL	2	0.106	0.113	0.109
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	11	0.077	0.180	0.141
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	5	0.105	0.168	0.127
1	Indian w/Bow	Cav w/Spring	45CAL	MS	584	0.022	0.050	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	28	0.030	0.048	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	7	0.033	0.043	0.040
1	Indian w/Bow	Cav w/Spring	45CAL	KK	4	0.019	0.048	0.034
1	Indian w/Bow	Cav w/Spring	45CAL	TL	10	0.029	0.048	0.042
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	25	0.099	0.192	0.121
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	12	0.085	0.246	0.116
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	25	0.073	0.181	0.113
1	Indian w/Smo	Cav w/Spring	Springfield	KK	28	0.025	0.262	0.117
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	8	0.105	0.166	0.138
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	16	0.063	0.142	0.116
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	6	0.108	0.274	0.173
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	7	0.069	0.166	0.110
1	Indian w/Sha	Cav w/Spring	Springfield	KK	18	0.080	0.144	0.109
1	Indian w/Smo	Cav w/Spring	Springfield	TL	1	0.104	0.104	0.104
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	6	0.110	0.270	0.152
1	Indian w/Spr	Cav w/Spring	Springfield	KK	10	0.099	0.255	0.143
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	5	0.146	0.234	0.204
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	5	0.124	0.275	0.218
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	4	0.065	0.143	0.108
1	Indian w/Win	Cav w/Spring	Winchester .	TL	4	0.052	0.177	0.139
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	5	0.102	0.278	0.168
1	Indian w/Spr	Cav w/Spring	Springfield	TL	1	0.190	0.190	0.190
1	Indian w/Rif	Cav w/Spring	Springfield	TL	2	0.179	0.183	0.181
2	Cav w/Spring	Indian w/Rif	Springfield	KK	15	0.062	0.203	0.157
2	Cav w/Spring	Indian w/Rif	Springfield	MS	100	0.065	0.219	0.135
2	Cav w/Spring	Indian w/Win	Springfield	MS	121	0.045	0.216	0.117
2	Cav w/Spring	Indian w/Sha	Springfield	KK	6	0.101	0.192	0.138
2	Cav w/Spring	Indian w/Sha	Springfield	MS	37	0.039	0.201	0.122
2	Cav w/Spring	Indian w/Smo	Springfield	MS	60	0.065	0.218	0.132
2	Cav w/Spring	Indian w/Hen	Springfield	MS	78	0.062	0.245	0.154
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	5	0.097	0.169	0.140
2	Cav w/Spring	Indian w/Win	Springfield	DUD	6	0.103	0.126	0.116
2	Cav w/Spring	Indian w/Win	Springfield	SUS	9	0.108	0.202	0.169
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	3	0.084	0.116	0.101
2	Cav w/Spring	Indian w/Spr	Springfield	MS	21	0.079	0.216	0.126
2	Cav w/Spring	Indian w/Bow	Springfield	MS	154	0.044	0.221	0.132
2	Cav w/Spring	Indian w/Win	Springfield	KK	29	0.080	0.203	0.158
2	Cav w/Spring	Indian w/Spr	Springfield	KK	4	0.085	0.187	0.154
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	5	0.117	0.197	0.155
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	4	0.083	0.239	0.132
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	4	0.072	0.169	0.129
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	1	0.109	0.109	0.109
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	2	0.123	0.150	0.136
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	4	0.109	0.147	0.131
2	Cav w/Spring	Indian w/Smo	Springfield	KK	13	0.044	0.182	0.136
2	Cav w/Spring	Indian w/Hen	Springfield	KK	13	0.097	0.176	0.150
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	4	0.092	0.193	0.148
2	Cav w/Spring	Indian w/Bow	Springfield	KK	13	0.041	0.180	0.083
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	2	0.093	0.111	0.102
2	Cav w/Spring	Indian w/Bow	Colt 1873	MS	7	0.040	0.043	0.042
2	Cav w/Spring	Indian w/Bow	Colt 1873	KK	2	0.043	0.046	0.044
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	4	0.178	0.183	0.180

Gray 3-5 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	MS	938	0.064	0.249	0.122
1	Indian w/Rif	Cav w/Spring	Springfield	MS	217	0.062	0.322	0.146

1	Indian w/Sha	Cav w/Spring	Springfield	MS	202	0.027	0.277	0.126
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	786	0.051	0.195	0.120
1	Indian w/Win	Cav w/Spring	Winchester .	KK	73	0.021	0.247	0.111
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	22	0.077	0.248	0.129
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	15	0.110	0.184	0.139
1	Indian w/Smo	Cav w/Spring	Springfield	MS	228	0.045	0.308	0.154
1	Indian w/Smo	Cav w/Spring	Springfield	KK	26	0.063	0.263	0.131
1	Indian w/Spr	Cav w/Spring	Springfield	MS	102	0.061	0.307	0.146
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	5	0.053	0.141	0.101
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	29	0.054	0.184	0.123
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	45	0.052	0.197	0.111
1	Indian w/Sha	Cav w/Spring	Springfield	KK	25	0.067	0.266	0.129
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	25	0.084	0.178	0.117
1	Indian w/Win	Cav w/Spring	Winchester .	TL	11	0.098	0.169	0.135
1	Indian w/Bow	Cav w/Spring	45CAL	MS	383	0.021	0.050	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	18	0.026	0.050	0.038
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	4	0.034	0.050	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	KK	3	0.021	0.047	0.035
1	Indian w/Rif	Cav w/Spring	Springfield	KK	30	0.061	0.271	0.132
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	10	0.065	0.303	0.165
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	15	0.084	0.260	0.165
1	Indian w/Smo	Cav w/Spring	Springfield	TL	3	0.078	0.217	0.139
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	21	0.054	0.246	0.112
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	11	0.064	0.202	0.111
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	3	0.076	0.165	0.116
1	Indian w/Rif	Cav w/Spring	Springfield	TL	5	0.080	0.170	0.123
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	5	0.074	0.176	0.133
1	Indian w/Spr	Cav w/Spring	Springfield	KK	14	0.071	0.230	0.133
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	4	0.078	0.119	0.096
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	8	0.100	0.221	0.130
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	8	0.114	0.272	0.216
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	1	0.254	0.254	0.254
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	2	0.209	0.234	0.222
1	Indian w/Spr	Cav w/Spring	Springfield	TL	2	0.180	0.181	0.181
1	Indian w/Bow	Cav w/Spring	45CAL	TL	5	0.027	0.045	0.037
1	Indian w/Sha	Cav w/Spring	Springfield	TL	1	0.158	0.158	0.158
2	Cav w/Spring	Indian w/Spr	Springfield	KK	7	0.074	0.167	0.108
2	Cav w/Spring	Indian w/Smo	Springfield	MS	106	0.060	0.231	0.124
2	Cav w/Spring	Indian w/Hen	Springfield	MS	131	0.065	0.246	0.141
2	Cav w/Spring	Indian w/Hen	Springfield	KK	23	0.076	0.179	0.106
2	Cav w/Spring	Indian w/Win	Springfield	MS	126	0.061	0.195	0.114
2	Cav w/Spring	Indian w/Spr	Springfield	MS	28	0.079	0.214	0.131
2	Cav w/Spring	Indian w/Rif	Springfield	MS	91	0.040	0.192	0.114
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	8	0.071	0.142	0.098
2	Cav w/Spring	Indian w/Smo	Colt 1873	MS	1	0.036	0.036	0.036
2	Cav w/Spring	Indian w/Smo	Colt 1873	KK	1	0.038	0.038	0.038
2	Cav w/Spring	Indian w/Win	Springfield	KK	28	0.065	0.120	0.089
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	6	0.080	0.120	0.103
2	Cav w/Spring	Indian w/Rif	Springfield	KK	24	0.070	0.142	0.100
2	Cav w/Spring	Indian w/Sha	Springfield	MS	43	0.068	0.203	0.112
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	4	0.093	0.120	0.110
2	Cav w/Spring	Indian w/Win	Springfield	DUD	5	0.085	0.163	0.128
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	2	0.074	0.083	0.079
2	Cav w/Spring	Indian w/Bow	Springfield	MS	175	0.062	0.236	0.127
2	Cav w/Spring	Indian w/Bow	Springfield	KK	87	0.062	0.159	0.092
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	6	0.097	0.211	0.145
2	Cav w/Spring	Indian w/Win	Springfield	SUS	6	0.075	0.127	0.104
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	1	0.102	0.102	0.102
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	2	0.072	0.079	0.075
2	Cav w/Spring	Indian w/Sha	Springfield	KK	8	0.068	0.165	0.107
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	12	0.069	0.195	0.119
2	Cav w/Spring	Indian w/Hen	Springfield	TL	2	0.126	0.169	0.147
2	Cav w/Spring	Indian w/Sha	Springfield	TL	1	0.172	0.172	0.172
2	Cav w/Spring	Indian w/Smo	Springfield	KK	20	0.067	0.153	0.096
2	Cav w/Spring	Indian w/Smo	Springfield	TL	1	0.172	0.172	0.172
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	11	0.072	0.141	0.098
2	Cav w/Spring	Indian w/Bow	Springfield	TL	1	0.067	0.067	0.067
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	2	0.084	0.084	0.084
2	Cav w/Spring	Indian w/Rif	Springfield	TL	2	0.082	0.126	0.104
2	Cav w/Spring	Indian w/Hen	Colt 1873	KK	1	0.037	0.037	0.037
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	1	0.119	0.119	0.119

Gray 3-6 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Rif	Cav w/Spring	Springfield	MS	222	0.063	0.284	0.138

1	Indian w/Smo	Cav w/Spring	Springfield	MS	211	0.069	0.286	0.148
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	886	0.059	0.243	0.129
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	11	0.073	0.243	0.119
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	7	0.097	0.180	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	MS	925	0.040	0.248	0.121
1	Indian w/Win	Cav w/Spring	Winchester .	KK	93	0.036	0.187	0.104
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	12	0.086	0.265	0.167
1	Indian w/Sha	Cav w/Spring	Springfield	KK	28	0.045	0.263	0.117
1	Indian w/Sha	Cav w/Spring	Springfield	MS	211	0.048	0.260	0.136
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	35	0.063	0.194	0.103
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	39	0.074	0.184	0.116
1	Indian w/Spr	Cav w/Spring	Springfield	MS	93	0.060	0.281	0.144
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	10	0.114	0.187	0.149
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	3	0.071	0.119	0.094
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	25	0.078	0.177	0.130
1	Indian w/Smo	Cav w/Spring	Springfield	KK	22	0.070	0.224	0.133
1	Indian w/Win	Cav w/Spring	Winchester .	TL	6	0.097	0.179	0.132
1	Indian w/Rif	Cav w/Spring	Springfield	KK	30	0.062	0.268	0.128
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	9	0.084	0.262	0.139
1	Indian w/Spr	Cav w/Spring	Springfield	KK	5	0.083	0.256	0.143
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	18	0.079	0.211	0.122
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	3	0.077	0.147	0.117
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	2	0.107	0.119	0.113
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	6	0.081	0.110	0.102
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	2	0.070	0.221	0.145
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	3	0.108	0.199	0.168
1	Indian w/Sha	Cav w/Spring	Springfield	TL	3	0.090	0.175	0.142
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	1	0.225	0.225	0.225
1	Indian w/Bow	Cav w/Spring	45CAL	MS	210	0.045	0.051	0.047
1	Indian w/Spr	Cav w/Spring	Springfield	TL	1	0.082	0.082	0.082
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	10	0.045	0.050	0.046
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	1	0.046	0.046	0.046
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	1	0.046	0.046	0.046
1	Indian w/Bow	Cav w/Spring	45CAL	KK	1	0.046	0.046	0.046
1	Indian w/Bow	Cav w/Spring	45CAL	TL	2	0.046	0.046	0.046
1	Indian w/Smo	Cav w/Spring	Springfield	TL	5	0.055	0.238	0.180
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	4	0.106	0.170	0.138
1	Indian w/Rif	Cav w/Spring	Springfield	TL	2	0.124	0.265	0.195
2	Cav w/Spring	Indian w/Smo	Springfield	MS	71	0.071	0.228	0.134
2	Cav w/Spring	Indian w/Smo	Springfield	KK	15	0.103	0.170	0.136
2	Cav w/Spring	Indian w/Win	Springfield	MS	111	0.073	0.210	0.122
2	Cav w/Spring	Indian w/Sha	Springfield	MS	37	0.082	0.199	0.124
2	Cav w/Spring	Indian w/Rif	Springfield	MS	81	0.063	0.200	0.132
2	Cav w/Spring	Indian w/Spr	Springfield	MS	29	0.071	0.245	0.144
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	3	0.125	0.249	0.190
2	Cav w/Spring	Indian w/Bow	Springfield	MS	108	0.079	0.200	0.132
2	Cav w/Spring	Indian w/Win	Springfield	DUD	4	0.057	0.124	0.099
2	Cav w/Spring	Indian w/Win	Springfield	KK	20	0.064	0.191	0.146
2	Cav w/Spring	Indian w/Hen	Springfield	MS	99	0.074	0.253	0.150
2	Cav w/Spring	Indian w/Bow	Springfield	KK	33	0.084	0.134	0.124
2	Cav w/Spring	Indian w/Sha	Springfield	KK	4	0.104	0.156	0.125
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	5	0.086	0.197	0.119
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	4	0.100	0.146	0.122
2	Cav w/Spring	Indian w/Hen	Springfield	KK	9	0.112	0.163	0.138
2	Cav w/Spring	Indian w/Spr	Springfield	KK	5	0.095	0.167	0.130
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	4	0.101	0.185	0.138
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	1	0.173	0.173	0.173
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	3	0.135	0.181	0.152
2	Cav w/Spring	Indian w/Rif	Springfield	KK	23	0.066	0.176	0.137
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	6	0.123	0.175	0.156
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	1	0.142	0.142	0.142
2	Cav w/Spring	Indian w/Win	Springfield	SUS	2	0.112	0.183	0.148
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	8	0.121	0.134	0.129
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	2	0.125	0.129	0.127
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	1	0.163	0.163	0.163

Gray 3-7 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Rif	Cav w/Spring	Springfield	MS	230	0.045	0.292	0.157
1	Indian w/Smo	Cav w/Spring	Springfield	MS	223	0.043	0.290	0.166
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	9	0.073	0.200	0.132
1	Indian w/Win	Cav w/Spring	Winchester .	KK	89	0.063	0.247	0.106
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	5	0.076	0.265	0.163
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	830	0.047	0.250	0.126
1	Indian w/Sha	Cav w/Spring	Springfield	MS	217	0.045	0.283	0.140

1	Indian w/Spr	Cav w/Spring	Springfield	MS	104	0.065	0.293	0.161
1	Indian w/Win	Cav w/Spring	Winchester .	MS	932	0.056	0.249	0.120
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	12	0.076	0.169	0.103
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	4	0.089	0.264	0.182
1	Indian w/Rif	Cav w/Spring	Springfield	KK	27	0.066	0.267	0.121
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	11	0.066	0.280	0.142
1	Indian w/Sha	Cav w/Spring	Springfield	KK	23	0.014	0.262	0.146
1	Indian w/Win	Cav w/Spring	Winchester .	TL	12	0.096	0.184	0.151
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	2	0.076	0.129	0.102
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	29	0.072	0.184	0.122
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	10	0.034	0.048	0.044
1	Indian w/Bow	Cav w/Spring	45CAL	MS	234	0.025	0.050	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	4	0.034	0.043	0.040
1	Indian w/Bow	Cav w/Spring	45CAL	KK	2	0.025	0.046	0.036
1	Indian w/Bow	Cav w/Spring	45CAL	TL	4	0.041	0.048	0.045
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	26	0.085	0.183	0.122
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	38	0.053	0.187	0.108
1	Indian w/Smo	Cav w/Spring	Springfield	KK	18	0.066	0.259	0.115
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	11	0.087	0.178	0.132
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	23	0.072	0.188	0.112
1	Indian w/Rif	Cav w/Spring	Springfield	TL	4	0.021	0.268	0.123
1	Indian w/Spr	Cav w/Spring	Springfield	KK	13	0.069	0.200	0.116
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	4	0.089	0.283	0.175
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	3	0.082	0.140	0.110
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	4	0.041	0.168	0.109
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	6	0.078	0.170	0.116
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	2	0.048	0.122	0.085
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	1	0.081	0.081	0.081
1	Indian w/Spr	Cav w/Spring	Springfield	TL	1	0.098	0.098	0.098
1	Indian w/Smo	Cav w/Spring	Springfield	TL	4	0.117	0.255	0.167
1	Indian w/Sha	Cav w/Spring	Springfield	TL	1	0.151	0.151	0.151
2	Cav w/Spring	Indian w/Smo	Springfield	KK	11	0.061	0.187	0.100
2	Cav w/Spring	Indian w/Win	Springfield	MS	127	0.063	0.205	0.117
2	Cav w/Spring	Indian w/Sha	Springfield	MS	40	0.038	0.198	0.122
2	Cav w/Spring	Indian w/Rif	Springfield	MS	73	0.062	0.215	0.121
2	Cav w/Spring	Indian w/Spr	Springfield	MS	17	0.070	0.229	0.136
2	Cav w/Spring	Indian w/Win	Springfield	DUD	1	0.111	0.111	0.111
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	1	0.116	0.116	0.116
2	Cav w/Spring	Indian w/Smo	Springfield	MS	68	0.065	0.247	0.135
2	Cav w/Spring	Indian w/Hen	Springfield	MS	61	0.056	0.288	0.154
2	Cav w/Spring	Indian w/Win	Springfield	KK	12	0.066	0.201	0.109
2	Cav w/Spring	Indian w/Sha	Springfield	DUD	3	0.101	0.185	0.132
2	Cav w/Spring	Indian w/Bow	Springfield	MS	72	0.060	0.224	0.128
2	Cav w/Spring	Indian w/Win	Springfield	SUS	6	0.076	0.204	0.110
2	Cav w/Spring	Indian w/Rif	Springfield	KK	12	0.067	0.221	0.119
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	3	0.084	0.122	0.105
2	Cav w/Spring	Indian w/Bow	Springfield	KK	35	0.057	0.240	0.133
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	6	0.057	0.231	0.164
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	3	0.064	0.124	0.097
2	Cav w/Spring	Indian w/Hen	Springfield	KK	8	0.061	0.230	0.125
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	5	0.085	0.215	0.152
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	3	0.096	0.233	0.163
2	Cav w/Spring	Indian w/Sha	Springfield	KK	3	0.048	0.196	0.136
2	Cav w/Spring	Indian w/Win	Colt 1873	MS	1	0.048	0.048	0.048
2	Cav w/Spring	Indian w/Win	Colt 1873	NE	1	0.041	0.041	0.041
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	1	0.126	0.126	0.126
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	3	0.068	0.215	0.158
2	Cav w/Spring	Indian w/Spr	Springfield	KK	4	0.064	0.230	0.136

Gray 3-8 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Sha	Cav w/Spring	Springfield	MS	200	0.050	0.281	0.146
1	Indian w/Rif	Cav w/Spring	Springfield	MS	226	0.067	0.301	0.167
1	Indian w/Win	Cav w/Spring	Winchester .	MS	793	0.052	0.260	0.117
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	784	0.052	0.249	0.128
1	Indian w/Smo	Cav w/Spring	Springfield	MS	229	0.070	0.325	0.170
1	Indian w/Smo	Cav w/Spring	Springfield	KK	26	0.070	0.261	0.142
1	Indian w/Win	Cav w/Spring	Winchester .	KK	94	0.048	0.245	0.106
1	Indian w/Spr	Cav w/Spring	Springfield	MS	88	0.048	0.309	0.154
1	Indian w/Rif	Cav w/Spring	Springfield	KK	24	0.066	0.258	0.120
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	6	0.081	0.204	0.119
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	23	0.063	0.159	0.101
1	Indian w/Sha	Cav w/Spring	Springfield	KK	24	0.057	0.266	0.121
1	Indian w/Spr	Cav w/Spring	Springfield	TL	2	0.132	0.145	0.139
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	9	0.106	0.187	0.139

1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	17	0.052	0.211	0.126
1	Indian w/Win	Cav w/Spring	Winchester .	TL	8	0.078	0.171	0.141
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	28	0.088	0.248	0.123
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	11	0.096	0.242	0.132
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	17	0.081	0.192	0.138
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	25	0.055	0.193	0.104
1	Indian w/Spr	Cav w/Spring	Springfield	KK	7	0.071	0.171	0.118
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	5	0.076	0.203	0.134
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	7	0.055	0.199	0.119
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	6	0.100	0.258	0.152
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	6	0.080	0.275	0.162
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	6	0.095	0.176	0.120
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	4	0.074	0.267	0.150
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	4	0.169	0.265	0.215
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	5	0.196	0.263	0.234
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	7	0.124	0.252	0.212
1	Indian w/Bow	Cav w/Spring	45CAL	MS	280	0.030	0.050	0.045
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	13	0.031	0.049	0.044
1	Indian w/Rif	Cav w/Spring	Springfield	TL	1	0.158	0.158	0.158
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	1	0.047	0.047	0.047
1	Indian w/Bow	Cav w/Spring	45CAL	KK	3	0.040	0.049	0.046
1	Indian w/Bow	Cav w/Spring	45CAL	TL	5	0.038	0.049	0.044
1	Indian w/Smo	Cav w/Spring	Springfield	TL	1	0.242	0.242	0.242
2	Cav w/Spring	Indian w/Win	Springfield	DUD	4	0.079	0.169	0.114
2	Cav w/Spring	Indian w/Win	Springfield	MS	103	0.070	0.270	0.116
2	Cav w/Spring	Indian w/Sha	Springfield	MS	39	0.066	0.280	0.129
2	Cav w/Spring	Indian w/Spr	Springfield	MS	22	0.085	0.240	0.139
2	Cav w/Spring	Indian w/Rif	Springfield	MS	71	0.082	0.281	0.137
2	Cav w/Spring	Indian w/Spr	Springfield	DUD	3	0.116	0.125	0.122
2	Cav w/Spring	Indian w/Win	Springfield	KK	21	0.067	0.277	0.131
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	1	0.101	0.101	0.101
2	Cav w/Spring	Indian w/Rif	Springfield	KK	18	0.086	0.291	0.156
2	Cav w/Spring	Indian w/Smo	Springfield	MS	72	0.070	0.289	0.136
2	Cav w/Spring	Indian w/Hen	Springfield	MS	94	0.076	0.300	0.149
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	5	0.087	0.256	0.125
2	Cav w/Spring	Indian w/Bow	Springfield	MS	95	0.071	0.305	0.141
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	4	0.086	0.287	0.150
2	Cav w/Spring	Indian w/Sha	Springfield	KK	6	0.084	0.282	0.124
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	6	0.087	0.296	0.177
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	6	0.090	0.297	0.171
2	Cav w/Spring	Indian w/Spr	Springfield	KK	1	0.078	0.078	0.078
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	3	0.084	0.259	0.143
2	Cav w/Spring	Indian w/Hen	Springfield	KK	17	0.068	0.297	0.193
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	19	0.085	0.298	0.209
2	Cav w/Spring	Indian w/Hen	Springfield	TL	1	0.082	0.082	0.082
2	Cav w/Spring	Indian w/Smo	Springfield	KK	16	0.103	0.297	0.188
2	Cav w/Spring	Indian w/Bow	Springfield	KK	66	0.070	0.297	0.160
2	Cav w/Spring	Indian w/Win	Springfield	SUS	7	0.082	0.277	0.219
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	2	0.118	0.301	0.210
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	6	0.108	0.292	0.230

Gray 3-9 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Rif	Cav w/Spring	Springfield	MS	246	0.056	0.293	0.161
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	870	0.053	0.248	0.130
1	Indian w/Rif	Cav w/Spring	Springfield	KK	18	0.063	0.263	0.137
1	Indian w/Win	Cav w/Spring	Winchester .	MS	1016	0.064	0.248	0.120
1	Indian w/Smo	Cav w/Spring	Springfield	MS	252	0.072	0.309	0.178
1	Indian w/Win	Cav w/Spring	Winchester .	KK	91	0.061	0.245	0.111
1	Indian w/Smo	Cav w/Spring	Springfield	KK	17	0.073	0.256	0.137
1	Indian w/Sha	Cav w/Spring	Springfield	MS	215	0.069	0.291	0.140
1	Indian w/Spr	Cav w/Spring	Springfield	MS	110	0.076	0.314	0.166
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	16	0.062	0.140	0.097
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	26	0.074	0.246	0.124
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	16	0.071	0.248	0.125
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	24	0.053	0.181	0.112
1	Indian w/Smo	Cav w/Spring	Springfield	TL	3	0.127	0.244	0.183
1	Indian w/Win	Cav w/Spring	Winchester .	TL	6	0.061	0.171	0.126
1	Indian w/Bow	Cav w/Spring	45CAL	MS	861	0.026	0.051	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	43	0.030	0.050	0.042
1	Indian w/Bow	Cav w/Spring	45CAL	KK	6	0.032	0.043	0.039
1	Indian w/Spr	Cav w/Spring	Springfield	TL	5	0.124	0.164	0.142
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	32	0.084	0.238	0.143
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	13	0.114	0.296	0.221
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	16	0.101	0.173	0.133

1	Indian w/Sha	Cav w/Spring	Springfield	KK	32	0.061	0.263	0.135
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	8	0.091	0.264	0.160
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	18	0.098	0.193	0.129
1	Indian w/Spr	Cav w/Spring	Springfield	KK	7	0.080	0.218	0.131
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	2	0.093	0.133	0.113
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	6	0.079	0.174	0.129
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	5	0.086	0.275	0.214
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	4	0.073	0.242	0.162
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	1	0.223	0.223	0.223
1	Indian w/Rif	Cav w/Spring	Springfield	TL	3	0.149	0.221	0.177
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	3	0.274	0.286	0.279
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	5	0.141	0.259	0.222
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	5	0.036	0.049	0.041
1	Indian w/Bow	Cav w/Spring	45CAL	TL	6	0.037	0.042	0.039
1	Indian w/Bow	Cav w/Spring	45CAL	MOB	2	0.040	0.048	0.044
2	Cav w/Spring	Indian w/Smo	Springfield	MS	78	0.082	0.282	0.143
2	Cav w/Spring	Indian w/Hen	Springfield	KK	25	0.080	0.286	0.183
2	Cav w/Spring	Indian w/Sha	Springfield	KK	5	0.104	0.268	0.169
2	Cav w/Spring	Indian w/Hen	Springfield	MS	75	0.079	0.252	0.159
2	Cav w/Spring	Indian w/Rif	Springfield	MS	91	0.058	0.268	0.126
2	Cav w/Spring	Indian w/Smo	Springfield	KK	22	0.110	0.281	0.180
2	Cav w/Spring	Indian w/Win	Springfield	MS	150	0.076	0.262	0.124
2	Cav w/Spring	Indian w/Sha	Springfield	MS	28	0.059	0.262	0.129
2	Cav w/Spring	Indian w/Win	Springfield	DUD	7	0.080	0.122	0.095
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	3	0.108	0.136	0.122
2	Cav w/Spring	Indian w/Spr	Springfield	MS	27	0.084	0.285	0.149
2	Cav w/Spring	Indian w/Bow	Springfield	MS	96	0.089	0.296	0.173
2	Cav w/Spring	Indian w/Win	Springfield	KK	26	0.075	0.265	0.171
2	Cav w/Spring	Indian w/Rif	Springfield	KK	25	0.070	0.270	0.165
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	2	0.142	0.240	0.191
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	3	0.103	0.164	0.123
2	Cav w/Spring	Indian w/Bow	Springfield	KK	65	0.091	0.286	0.221
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	3	0.124	0.254	0.180
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	3	0.122	0.240	0.172
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	10	0.248	0.273	0.257
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	8	0.118	0.283	0.195
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	2	0.239	0.277	0.258
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	21	0.091	0.288	0.236
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	7	0.242	0.278	0.259
2	Cav w/Spring	Indian w/Win	Springfield	SUS	8	0.093	0.261	0.239
2	Cav w/Spring	Indian w/Spr	Springfield	KK	5	0.118	0.281	0.233

Gray 3-10 Direct Fire Effects

Side	Shooter	Target	Ammo	Effect	Shots	Min Range	Max Range	Avg Range
1	Indian w/Win	Cav w/Spring	Winchester .	MS	847	0.050	0.249	0.118
1	Indian w/Rif	Cav w/Spring	Springfield	MS	188	0.062	0.269	0.127
1	Indian w/Smo	Cav w/Spring	Springfield	SUS	5	0.097	0.242	0.153
1	Indian w/Smo	Cav w/Spring	Springfield	MS	172	0.063	0.266	0.134
1	Indian w/Spr	Cav w/Spring	Springfield	KK	17	0.060	0.255	0.135
1	Indian w/Win	Cav w/Spring	Winchester .	SUS	16	0.060	0.163	0.109
1	Indian w/Spr	Cav w/Spring	Springfield	MS	91	0.067	0.289	0.135
1	Indian w/Sha	Cav w/Spring	Springfield	MS	186	0.058	0.258	0.127
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MS	908	0.060	0.209	0.126
1	Indian w/Win	Cav w/Spring	Winchester .	KK	74	0.050	0.247	0.104
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	SUS	37	0.078	0.240	0.122
1	Indian w/Smo	Cav w/Spring	Springfield	KK	24	0.064	0.252	0.110
1	Indian w/Rif	Cav w/Spring	Springfield	KK	22	0.071	0.238	0.131
1	Indian w/Sha	Cav w/Spring	Springfield	TL	4	0.085	0.118	0.101
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	KK	23	0.069	0.179	0.104
1	Indian w/Sha	Cav w/Spring	Springfield	KK	28	0.060	0.238	0.111
1	Indian w/Win	Cav w/Spring	Winchester .	TL	6	0.093	0.167	0.138
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	DUD	32	0.067	0.190	0.132
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	FP	3	0.079	0.127	0.101
1	Indian w/Sha	Cav w/Spring	Springfield	SUS	6	0.068	0.237	0.130
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	TL	7	0.088	0.142	0.114
1	Indian w/Win	Cav w/Spring	Winchester .	DUD	27	0.081	0.177	0.123
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MOB	4	0.100	0.119	0.107
1	Indian w/Rif	Cav w/Spring	Springfield	DUD	4	0.093	0.138	0.112
1	Indian w/Smo	Cav w/Spring	Springfield	DUD	5	0.074	0.224	0.126
1	Indian w/Smo	Cav w/Spring	Springfield	TL	7	0.067	0.252	0.149
1	Indian w/Hen	Cav w/Spring	Henry .44 Ca	MFP	13	0.078	0.238	0.135
1	Indian w/Sha	Cav w/Spring	Springfield	DUD	2	0.086	0.184	0.135
1	Indian w/Spr	Cav w/Spring	Springfield	SUS	3	0.092	0.144	0.120
1	Indian w/Rif	Cav w/Spring	Springfield	SUS	12	0.078	0.250	0.146
1	Indian w/Spr	Cav w/Spring	Springfield	DUD	2	0.108	0.144	0.126

1	Indian w/Spr	Cav w/Spring	Springfield	TL	3	0.097	0.254	0.173
1	Indian w/Bow	Cav w/Spring	45CAL	MS	552	0.029	0.051	0.044
1	Indian w/Bow	Cav w/Spring	45CAL	MFP	6	0.035	0.050	0.043
1	Indian w/Bow	Cav w/Spring	45CAL	SUS	24	0.031	0.051	0.043
1	Indian w/Rif	Cav w/Spring	Springfield	TL	2	0.176	0.255	0.216
1	Indian w/Bow	Cav w/Spring	45CAL	KK	2	0.033	0.034	0.034
1	Indian w/Bow	Cav w/Spring	45CAL	TL	6	0.038	0.050	0.044
2	Cav w/Spring	Indian w/Hen	Springfield	MS	93	0.074	0.266	0.136
2	Cav w/Spring	Indian w/Smo	Springfield	KK	31	0.062	0.223	0.162
2	Cav w/Spring	Indian w/Smo	Springfield	TL	1	0.125	0.125	0.125
2	Cav w/Spring	Indian w/Smo	Springfield	MS	86	0.069	0.258	0.136
2	Cav w/Spring	Indian w/Rif	Springfield	MS	93	0.062	0.240	0.140
2	Cav w/Spring	Indian w/Hen	Springfield	KK	31	0.056	0.234	0.163
2	Cav w/Spring	Indian w/Spr	Springfield	MS	30	0.074	0.263	0.134
2	Cav w/Spring	Indian w/Rif	Springfield	KK	35	0.068	0.232	0.164
2	Cav w/Spring	Indian w/Win	Springfield	MS	129	0.077	0.268	0.125
2	Cav w/Spring	Indian w/Sha	Springfield	MS	40	0.066	0.273	0.136
2	Cav w/Spring	Indian w/Win	Springfield	KK	48	0.072	0.234	0.156
2	Cav w/Spring	Indian w/Win	Springfield	SUS	7	0.071	0.229	0.152
2	Cav w/Spring	Indian w/Win	Springfield	DUD	7	0.074	0.234	0.158
2	Cav w/Spring	Indian w/Sha	Springfield	KK	13	0.076	0.235	0.159
2	Cav w/Spring	Indian w/Bow	Springfield	MS	128	0.064	0.238	0.142
2	Cav w/Spring	Indian w/Hen	Springfield	DUD	8	0.055	0.261	0.148
2	Cav w/Spring	Indian w/Win	Springfield	TL	2	0.111	0.116	0.113
2	Cav w/Spring	Indian w/Rif	Springfield	DUD	4	0.084	0.235	0.166
2	Cav w/Spring	Indian w/Smo	Springfield	DUD	1	0.158	0.158	0.158
2	Cav w/Spring	Indian w/Hen	Springfield	SUS	10	0.097	0.203	0.182
2	Cav w/Spring	Indian w/Sha	Springfield	SUS	10	0.073	0.235	0.200
2	Cav w/Spring	Indian w/Bow	Springfield	KK	77	0.050	0.232	0.125
2	Cav w/Spring	Indian w/Bow	Springfield	DUD	6	0.067	0.183	0.133
2	Cav w/Spring	Indian w/Spr	Springfield	KK	10	0.059	0.237	0.158
2	Cav w/Spring	Indian w/Bow	Springfield	SUS	10	0.101	0.213	0.142
2	Cav w/Spring	Indian w/Smo	Springfield	SUS	7	0.108	0.213	0.180
2	Cav w/Spring	Indian w/Rif	Springfield	SUS	5	0.119	0.217	0.177
2	Cav w/Spring	Indian w/Spr	Springfield	SUS	3	0.204	0.221	0.210

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